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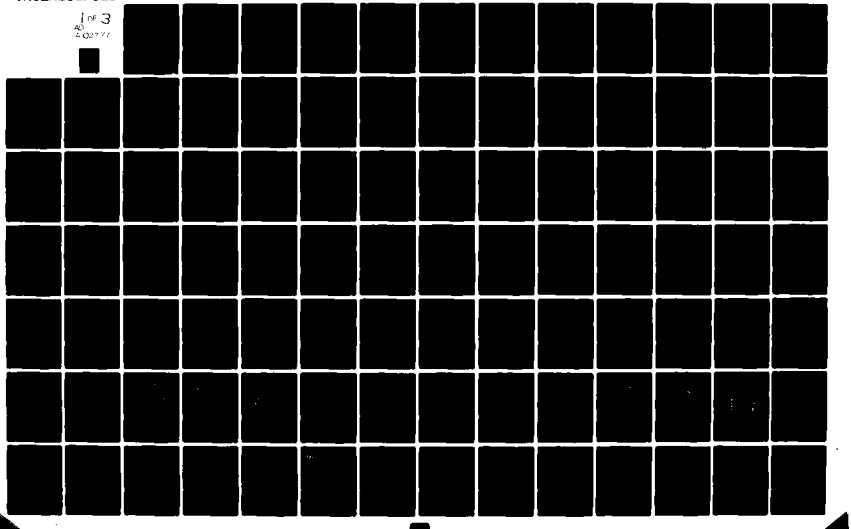

LEVEL III

12

FINAL
ENVIRONMENTAL IMPACT STATEMENT.

6

U. S. NAVY DEEPENING OF
PINOLE SHOAL AND MARE ISLAND STRAIT
REGULATORY PERMIT APPLICATION
BY
THE COMMANDER, MARE ISLAND SHIPYARD,
SOLANO COUNTY, CALIFORNIA.

PUBLIC NOTICE 12859-24

U. S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CALIFORNIA

11 JULY 1981

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

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1. REPORT NUMBER	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER: AD-A102 777
4. TITLE *(and Subtitle)*: U.S. Navy Deepening of Pinole Shoal and Mare Island Strait Regulatory Permit Application by the Commander, Mare Island Shipyard, Solano County, California	5. TYPE OF REPORT & PERIOD COVERED: Final Environmental Impact Statement 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: U.S. Army Corps of Engineers San Francisco Dist. 211 Main Street San Francisco, California 94105	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS	12. REPORT DATE: July 1981 13. NUMBER OF PAGES: 196
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*: Office of the Chief of Engineers U. S. Department of the Army Washington, D. C. 20314	15. SECURITY CLASS. *(of this report)*: Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for Public Release; Distribution Unlimited

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Dredging

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

U.S. Navy dredging approxmiately 1,600,000 cubic yards of material from Pinole Shoal and Mare Island Strait. New channel depths would be -36 feet MLLW at both Pinole Shoal and Mare Island Strait.

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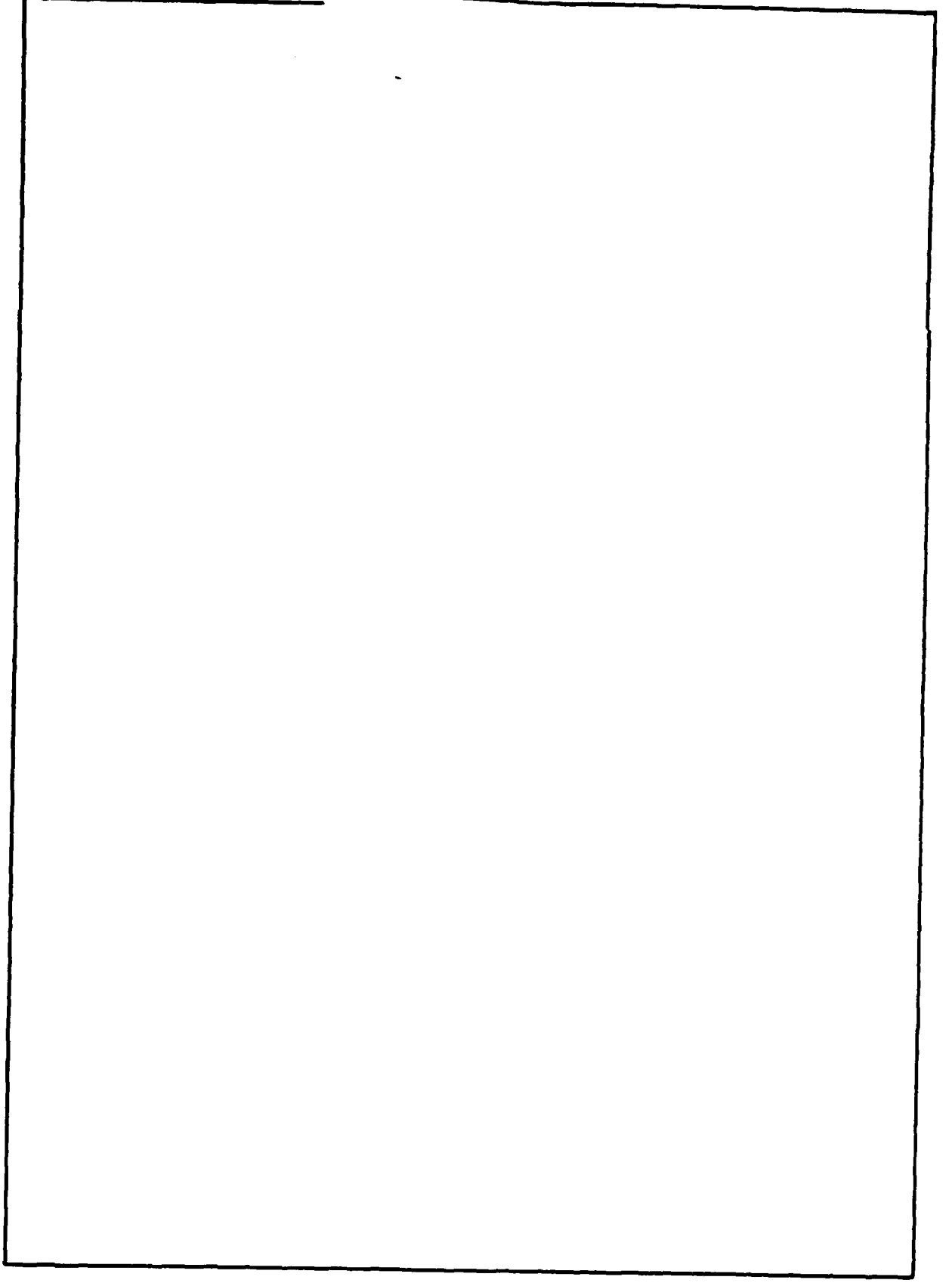

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105

SPNED-E/SPNCO-R

RESPONSE REQUIRED BY: 13 SEP 81

U. S. NAVY DEEPENING OF PINOLE SHOAL AND MARE ISLAND STRAIT FINAL ENVIRONMENTAL IMPACT STATEMENT: COMMENT PERIOD 6 AUG 1981

TO WHOM IT MAY CONCERN:

1. As announced in Public Notice No. 12859-24 (11 October 1979), the Commander, Mare Island Naval Shipyard, Vallejo, California 94592, has applied for a Department of the Army permit to dredge approximately 100,000 cubic yards of material from Pinole Shoal with aquatic disposal of the dredged material at the existing San Pablo Bay (SF 10) disposal site and dredge approximately 1,500,000 cubic yards of material from Mare Island Strait with aquatic disposal of the dredged material at the existing Carquinez Strait (SF 9) disposal site. The proposed dredging would deepen Pinole Shoal Channel one foot (from -35 feet mean lower low water (MLLW) to -36 feet MLLW). The proposed new channel depths would improve navigational safety of the latest naval ship design expected to use the Mare Island Shipyard in the spring of 1982.

2. In response to the National Environmental Policy Act (NEPA) of 1969, Public Law 91-190, and the Regulations for Implementing The Procedural Provisions of NEPA (40 CFR 1500-1508), the San Francisco District, U. S. Army Corps of Engineers has prepared a Final Environmental Impact Statement (FEIS) for the subject permit application. The Draft Environmental Impact Statement for this project was issued 30 April 1981.

3. The District is now soliciting comments and views of appropriate government agencies, interested groups and individuals concerning the FEIS. Please submit your comments to the Commander, San Francisco District, by the date indicated above so that they can be considered along with other relevant information in arriving at a final decision on the permit application. The final decision on the permit cannot be made until 30 days have passed from the announcement in the Federal Register that the FEIS has been filed with the Environmental Protection Agency or until 30 days from the mailing of the document, whichever date is later.

4. Copies of the FEIS are available for review by contacting the San Francisco District (415-556-6980) and at the Vallejo City Library.

Sincerely,

PAUL BAILWICH, JR.
Colonel, CE
Commanding

U. S. NAVY DEEPENING OF PINOLE SHOAL
AND MARE ISLAND STRAIT
SOLANO COUNTY, CALIFORNIA

REGULATORY PERMIT APPLICATION BY
THE COMMANDER, MARE ISLAND SHIPYARD
PUBLIC NOTICE 12859-24

( ) DRAFT ENVIRONMENTAL IMPACT STATEMENT (X) FINAL ENVIRONMENTAL IMPACT STATEMENT

Responsible Agency: U. S. Army Engineer District, San Francisco
211 Main Street
San Francisco, California 94105

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1. Name of Action: (X) ADMINISTRATIVE ( ) LEGISLATIVE

2. Authority. Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act.

3. Description of Action. The applicant proposes to dredge approximately 100,000 cubic yards of material from Pinole Shoal with aquatic disposal of the dredged material at the existing San Pablo Bay (SF 10) disposal site, and dredge approximately 1,500,000 cubic yards of material from Mare Island Strait with aquatic disposal of the dredged material at the existing Carquinez Strait (SF 9) disposal site. As a result of the proposed dredging Pinole Shoal Channel would increase from -35 feet mean lower low water (MLLW) to -36 feet MLLW in depth and Mare Island Strait would increase from -32 feet MLLW to -36 feet MLLW in depth.

4. Environmental Impacts. Provide safe navigable channels required for the unrestricted movement and operation of the latest naval ship design, maintain employment levels at shipyard, increase sediment suspension, temporary reduction in concentration of dissolved oxygen, destruction/transportation/covering of benthic organisms, increased turbidity and resultant confusion to migrating anadromous fish, stress on planktonic larvae, and reduction in photosynthesis.

5. Alternatives Considered. No project, proposed project with aquatic disposal of dredged material, proposed project with land disposal of dredged material.

U.S. NAVY DEEPENING OF PINOLE SHOAL AND MARE ISLAND STRAIT

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PLATES

APPENDICES

1.00 SUMMARY AND INTRODUCTION

1.01 The Commander, Mare Island Naval Shipyard, Vallejo, California 94592, has applied for a Department of the Army permit (Application and Public Notice No. 12859-24, Appendix B, Document B-1 and B-2 respectively) to:

- dredge approximately 100,000 cubic yards of material from Pinole Shoal to establish a depth of 36 feet (plus two feet allowable overdepth dredging) below mean lower low water (MLLW) with aquatic disposal of the dredged material at the existing San Pablo Bay (SF 10) disposal site (refer to Plate 1),

and

- dredge approximately 1,500,000 cubic yards of material from Mare Island Strait to establish a depth of 36 feet (plus two feet allowable overdepth dredging) below MLLW with aquatic disposal of the dredged material at the existing Carquinez Strait (SF 9) disposal site (refer to Plate 2).

1.02 The new depth in these two channels would improve navigational safety of the latest naval ship design (SSN 688 Class submarine) expected to arrive at Mare Island Shipyard in the spring of 1982.

1.03 Associated with new channel depths at Pinole Shoal and Mare Island Strait are the future operation and maintenance dredging requirements for maintaining channel depths at 36 feet below MLLW. While the operation and maintenance dredging of these channels to 36 feet below MLLW is not included in the pending permit application (#12859-24), the impacts from future operation and maintenance dredging of these channels are considered in this environmental impact statement.

1.04 Purpose of and Need for the Proposal. The purpose of the proposed dredging project is to deepen Pinole Shoal and Mare Island Strait to accommodate a current Naval Ship design -- SSN 688 Class submarines. Presently, Pinole Shoal is maintained at 35 feet below MLLW and Mare Island Strait is maintained at 32 feet below MLLW. The SSN 688 Class submarines require a depth of 36 feet below MLLW for safe navigation.

1.05 Authority. The Army's authority over the proposed project is based upon Section 10 of the River and Harbor Act (RHA) of 1899 (33 U.S.C. Sec. 403) and upon Section 404 of the Clean Water Act (CWA) (33 U.S.C. Sec. 1344) which pertains to the discharge of dredged or fill material into the waters of the United States. In Leslie Salt Co. vs. Froehlke 578 F. 2d 742, 753 (9th Cir. 1978), the court held that the Corps' jurisdiction under the RHA extends to all lands covered by the ebb and flow of the tide to the mean high water (MHW) mark in its unobstructed, natural state, including diked areas below former MHW. Section 10 of the RHA of 1899 regulates any work or structure placed within this jurisdiction. This applies to the proposed project dredging and dredged material disposal operations (i.e. Alternatives #2-A, #2-B, #2-C, and #3).

1.06 Section 404 of the CWA authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits, after notice and opportunity for public hearings, for the discharge of dredged or fill material at specified disposal sites into all waters of the United States. This only applies to the proposed project dredged material disposal operations (i.e. alternatives #2-A, #2-B, #2-C, and the Pinole Shoal-San Pablo Bay portion of alternative #3).

1.07 Beneficial/Adverse Impacts of the Proposed Action. The proposed project would:

a. provide safe navigable channels required for the unrestricted movement and operation of the latest naval ship design.

b. maintain employment levels at the shipyard.

c. temporarily increase sediment suspension.

d. temporarily reduce concentration of dissolved oxygen.

e. destroy/transport/cover benthic organisms.

f. temporarily increase turbidity resulting in confusion to migrating anadromous fish and a reduction in photosynthesis.

g. stress planktonic larvae.

1.08 Purpose of Final Environmental Impact Statement (EIS).

1.09 In response to the provisions of the National Environmental Policy Act of 1969, Public Law 91-190, 42 U.S.C. Sec. 4321 et seq, an evaluation of the impacts of the proposed activities on all aspects of the quality of the human environment is required prior to any permit application being considered for approval. This EIS addresses such an evaluation of the deepening of Pinole Shoal and Mare Island Strait as well as the required maintenance associated with deeper channels.

1.10 An important source of information for this Final EIS was the Final Composite Environmental Statement - Maintenance Dredging Existing Navigation Projects San Francisco Bay Region California (December 1975). This Final Composite EIS is incorporated by reference into this Draft EIS.

1.11 Another important source of information for this Final EIS was the Dredge Disposal Study San Francisco Bay and Estuary (February 1977). This study addressed the mechanisms involved and the interrelationships of the various physical, chemical and biological parameters being influenced by dredging or influencing dredging in the Bay. The study investigated: a) the factors associated with dredging and aquatic disposal in the Bay, b) the condition of pollutants, c) alternative disposal methods, and d) dredging technology.

1.12 Interrelationship and Compatibility of the Project with Existing or Proposed Corps and other Federal Projects.

1.13 Federal navigation projects (referred to as Operation and Maintenance (O&M) projects).

a. Pinole Shoal Channel. The Pinole Shoal Channel in San Pablo Bay was first authorized by the RHA of 27 February 1911 to a depth of 30 feet below MLLW and width of 500 feet extending approximately 8 miles. The channel was deepened to 35 feet below MLLW and widened to 600 feet under the River and Harbor Act of 8 August 1917 and 21 January 1927. The existing channel dimensions of 35 feet below MLLW, 600 feet wide, and approximately 8 miles long (Plate 1) are dredged every other year. The average annual quantity of maintenance dredging has been 361,000 cubic yards since 1960 with disposal of the dredged material at the San Pablo Bay (SF 10) disposal site. This channel is not dredged during the month of November due to an unwritten agreement with sport fishing interests.

b. Mare Island Strait. Mare Island Strait is located between the Napa River and Carquinez Strait just east of San Pablo Bay. Mare Island Strait has received a series of navigation improvements beginning with the Department of Navy in 1892 with subsequent improvements by the Corps of Engineers under the RHA of 13 June 1902, 27 February 1911, 8 August 1917, 21 January 1927, 20 June 1938, and 2 March 1945. The existing authorized dimensions (Plate 4) include: a channel 30 feet below MLLW, 700 feet wide through Mare Island Strait, flaring to a turning basin generally 1,000 feet wide from former Dike No. 6 to within 75 feet southerly from the causeway between Vallejo and Mare Island then 26 feet below MLLW to the causeway; for dredging two approach areas 20 feet below MLLW to the waterfront at Vallejo and South Vallejo (these two approach areas were never constructed and are considered inactive); and for dredging two approach areas to Navy yard piers at the south end of Mare Island (the configuration of these piers does not require dredging of the approach areas by the Corps).

1.14 The Corps only dredges those portions of the authorized channel which receive frequent use by deep draft vessels and which have shoaled in above the authorized depth (refer to Plate 4 for those areas usually dredged by the Corps). In addition, the westerly 600-foot-wide section of the turning basin is maintained to a depth of 32 feet below MLLW in order to accomodate vessel movement to and from the Naval Shipyard (refer to Plate 4). This additional two feet of channel depth was previously maintained by the Navy and is now maintained by the Corps for national defense purposes as authorized by Section 117 of the RHA of 13 August 1968.

1.15 The average annual quantity of maintenance dredging has been 2,230,000 cubic yards of material since 1960. Annual maintenance dredging is typically conducted in two phases: September through November and February through April with the annual volume of dredging being divided almost equally between the two phases. Historically the dredging has been performed by the Corps hopper dredge with disposal at the Congressionally authorized Carquinez Strait disposal site (reference RHA of 21 January 1927).

1.16 Related Projects.

a. Deepening of Pinole Shoal channel to 35 feet, widening to 750 feet, and a maneuvering area at the Oleum oil pier in Davis Point, have all been authorized under the River and Harbor Act of 27 September 1965, but have not been accomplished. These navigation improvements are being studied under the San Francisco Bay to Stockton Project (John F. Baldwin and Stockton Ship Channels) which is under advanced engineering and design studies. The Pinole Shoal deepening and widening would involve removal of 12,200,000 cubic yards, and the Oleum maneuvering area another 3,000,000 cubic yards of material. If the deepening and widening are accomplished, it would increase maintenance dredging requirements from the present 361,000 cubic yards per year to 1,750,000 cubic yards per year.

b. Union Oil of California received a Corps permit (number 10331-52) dated 29 January 1975 to perform maintenance dredging of 90,000 cubic yards at the Oleum oil pier for a period of five years. The purpose of the dredging is to maintain the general maneuvering area near the pier to a depth of 35 feet below MLLW. Material is dredged by clamshell and barged to the Carquinez Strait disposal site (SF 9). By Letter of Permission Number 13038-52 dated 16 November 1979 the Corps authorized a time extension for completion of maintenance dredging to November 1984. If the Baldwin and Stockton Ship Channel project is improved as described above, maintenance dredging of part or all of the Oleum maneuvering area may, in the future, be performed by the Corps as part of the Pinole Shoal Channel.

c. The Navy currently dredges approximately 500,000 cubic yards of material per year in Mare Island Strait to maintain berthing areas at Mare Island Naval Shipyard. The dredging area (see Plate 4), extends from Highway 37 bridge to the three parallel Navy finger piers at the southern part of Mare Island and includes maneuvering areas around Piers 34 and 35 at the southern end of Mare Island. To perform this maintenance dredging, the Navy owns and operates a 12-inch hydraulic cutter suction dredge which is permanently set up at Mare Island. The dredge mixes large quantities of water with the dredged material to form a slurry which is then pumped via pipeline to a land disposal site. The dredge is connected to any of four permanent pipelines by floating flexible pipe to permit movement of the dredge plant. The permanent pipeline crosses Mare Island to seven diked areas on the island's western side (see Plate 4). The Navy has performed dredging in Mare Island Strait since 1900. In September 1978 the Navy received a Corps permit (number 11680-24) for annual maintenance dredging of 600,000 cubic yards of material for a period of 10 years. The total volume of material permitted to be dredged is 6,000,000 cubic yards over the 10 year period. Maintenance dredging is to be performed by hydraulic dredge (except during repair of the hydraulic dredge, then clamshell dredge with truck haul is used) with disposal at the existing land disposal ponds within the shipyard which are located behind levees and above mean high water (MHW). The permit only applies to the dredging activity since the land disposal areas are above MHW and therefore outside Corps jurisdiction.

d. As part of its waterfront redevelopment plan, the City of Vallejo is constructing the South Vallejo Industrial Park on a 207 acre site located across Mare Island Strait from the Navy finger piers. This development project is divided into two areas: the north area (Kaiser Steel Marine Assembly Yard) is used for fabrication of offshore oil exploration and production equipment and the south area (Peter Kiewit & Sons Company) is used for marine construction activities. The following are Corps permits issued in connection with the South Vallejo Industrial Park.

1. North Area. The City of Vallejo received a Corps permit (number 9510-24 and dated 9 October 1974) for construction of a pile supported dock and launchways, dredging of approximately 360,000 cubic yards of material from Mare Island Strait with annual maintenance dredging of 25,000 cubic yards (dredged material disposal by barge at Carquinez Strait (SF 9) aquatic site), removal of an existing timber pier and "training wall" and relocation of a reinforced concrete pipe storm drain. The pile supported dock and launchways were not constructed. The intitial dredging work (approximately 240,000 cubic yards), removal of the timber pier, and relocation of the storm drain were completed. Maintenance dredging has been performed once (in 1975). By Letter of Permission number 9633-24 dated 19 December 1974, the Corps authorized a 700 foot long cellular cofferdam. Five hundred feet of the cofferdam were constructed in 1975. By Corps Letter of Permission number 10737-24 dated 29 January 1976, the City of Vallejo received authorization to increase the yearly maintenance dredging volume from 25,000 cubic yards to 50,000 cubic yards. As mentioned above the maintenance dredging has not been required since 1975. A Corps Letter of Permission number 12743-24 dated 10 May 1979 extended the completion date of permit number 9510-24 to 3 October 1982.

1.17 On 19 July 1977 the City of Vallejo was issued a permit (number 11058-24) to install an additional 150 linear feet of cellular cofferdam and to dredge by clamshell, approximately 300,000 cubic yards of material from Mare Island Strait with barge disposal of the dredged material at the Carquinez Strait (SF 9) aquatic site. The dredging would permit placement of the cofferdam and deepening of the basin. The purpose of the project is to allow the simultaneous fabrication of two offshore drilling platforms and dock frontage for barge loading. The City of Vallejo received a Corps Letter of Permission No. 12176-24 dated 12 April 1978 to extend the construction start date for permit number 11058-24.

1.18 By Corps Letter of Permission No. 12358-24 dated 20 September 1978 the City of Vallejo was authorized to amend Corps permit number 11058-24. This amendment permitted the excavation of 4,000 cubic yards of material (with all excavated material disposed of on land above MHW) to create a 150 foot by 400 foot long basin which would allow construction of a steel barge at the Kaiser Steel Marine Assembly Yard. Upon construction of the barge the levee between the existing water surface of Mare Island Strait and the barge basin would be breached and the barge floated out. After the barge "float out" the embankment would be rebuilt and the basin dewatered. The Corps authorized, by Letter of Permission number 13376-24 dated 3 July 1980 a time extension for completion of permit number 11058-24 to 31 December 1983.

2. South Area. The City of Vallejo received a Corps permit (number 12827-24 and dated 24 March 1980) to rehabilitate 10 existing mooring dolphins, rehabilitate 3,700 square feet (sf) and remove 1,750 sf of an existing pier, remove an existing ferry slip, remove 2,500 sf of an existing pier, construct a 20,000 sf pile supported pier, construct a 450 ft. long sheet pile bulkhead with wing walls for a wharf, permanently moor a 3,000 sf floating barge for a landing dock, place 15,000 cubic yards of riprap, place 70,000 cubic yards of fill in wetland and tidal areas, construct 13 new mooring dolphins, construct 2 pile supported equipment approach trestles with a sheet pile bulkhead, dredge 350,000 cubic yards of material initially by clamshell and perform maintenance dredging on an annual average of approximately 25,000 cubic yards thereafter for period of ten years (for an approximate total of 250,000 cubic yards) with dredged material disposal by barge at the Carquinez Strait (SF 9) aquatic site. This project is currently being constructed.

e. The City of Vallejo received a Corps permit (number 9696-24 and dated 14 January 1976) for maintenance dredging at the Vallejo Municipal Marina. The permit authorizes the City to perform maintenance dredging of 138,000 cubic yards of material by hydraulic dredge to a depth of 8 to 10 feet below MLLW with land disposal of the dredged material at an adjacent 55 acre site north of the Mare Island causeway above MHW and therefore outside of Corps jurisdiction. This land area has previously been used for disposal of dredged material. The current permit expires 31 December 1981. No dredging has been performed for the last 1-1/2 years due to the city's dredge being inoperative. It is noted that the City of Vallejo has constructed a breakwater around both the Municipal Marina and the Vallejo Yacht Club for the purpose of minimizing siltation in the marinas and thus reduce maintenance dredging requirements.

f. The Vallejo Yacht Club received Corps permit number 10981-24 dated 15 November 1976 to strengthen an existing marina breakwater by driving a total of 164 timber piles and to hydraulically dredge approximately 50,000 cubic yards of material from the marina basin in Mare Island Strait with land disposal at the 55 acre site mentioned above. By Letter of Permission number 12929-24 dated 2 August 1979, the Corps authorized a time extension for completion of the work to 27 October 1980. Work authorized under this permit has been completed.

2.00 PURPOSE OF AND NEED FOR THE PROPOSAL.

The purpose of the proposed dredging project is to deepen Pinole Shoal and Mare Island Strait to accommodate a current Naval Ship design--SSN 688 Class submarines. Presently, Pinole Shoal is maintained at 35 feet below MLLW and Mare Island Strait is maintained at 32 feet below MLLW. The SSN 688 Class submarines require a depth of 36 feet below MLLW for safe navigation. Because the permit applicant is a governmental agency the applicant's purpose and need may be considered the same as the public purpose and need for the proposed project.

3.00 ALTERNATIVES

3.01 Planning Alternatives. This Final Environmental Impact Statement considers two basic alternatives: no project and proposed project. In addition, alternatives considered under the proposed project are alternative methods of dredging and alternative disposal sites. These alternatives are discussed throughout the text in the order presented below. Appendix A discusses the fundamentals of dredging.

3.02 Alternative #1. No project. This alternative considers the effects of not dredging Pinole Shoal (PS) and Mare Island Strait (MIS) to a new depth of 36 feet below MLLW.

3.03 Alternative #2. Proposed project with aquatic disposal of dredged material. This alternative considers the effects of dredging PS and MIS to a depth of 36 feet below MLLW with aquatic disposal of the PS dredged material at San Pablo Bay (SF 10) and aquatic disposal of the MIS dredged material at Carquinez Strait (SF 9). (Reference Plates 1 and 2). The San Pablo Bay (SF 10) and Carquinez Strait (SF 9) sites are historical open water disposal sites in San Francisco Bay which have been designated for continual use (reference Public Notice No. 78-1 issued by the U.S. Army Corps of Engineers, San Francisco District on 30 July 1979 and titled Supplemental Regional Procedure for Discharge of Dredged or Fill Material). Following is a description of the San Pablo Bay (SF 10) and Carquinez Strait (SF 9) designated aquatic disposal sites:

a. San Pablo Bay (SF 10): 38°00'28"N, 122°24'55"W
Distance: 2.6 nautical miles NE of Pt. San Pedro at Black and White Buoy.
Depth: 38-40 feet, average 39 feet MLLW
Size: Rectangle 1,500 feet wide by 3,000 feet long with axis bearing 50° true.

b. Carquinez Strait (SF 9): 38°03'50"N, 122°15'55"W
Distance: 0.8 nautical miles from Mare Island Strait entrance.
Depth: 28-56 feet, average 42 feet MLLW
Size: Rectangle 1,000 feet wide by 2,000 feet long with axis bearing 80° true.

3.04 Two basic methods of dredging are considered with respect to the proposed project: mechanical and hydraulic. Also, with respect to hydraulic dredging, two types of dredging are considered: self-propelled hopper dredge and cutterhead pipeline. Thus the array of alternatives considered for the proposed project are defined as follows:

3.05 Alternative 2-A. This alternative considers the effects of mechanical clamshell dredging PS and MIS to a depth of 36 feet below MLLW with aquatic barge disposal at San Pablo Bay (SF 10) and Carquinez Strait (SF 9) respectively.

3.06 Alternative 2-B. This alternative addresses the effects of dredging PS and MIS by self-propelled hopper dredge to a depth of 36 feet below MLLW with dredged material disposal at the San Pablo Bay (SF 10) and Carquinez Strait (SF 9) aquatic sites.

3.07 Alternative 2-C. This alternative includes the effects of dredging PS and MIS by hydraulic cutterhead to a depth of 36 feet below MLLW with pipeline disposal of dredged material at the San Pablo Bay (SF 10) and Carquinez Strait (SF 9) aquatic sites.

3.08 Alternative #3. Hydraulic cutterhead dredging with pipeline disposal on land. This alternative considers the effects of dredging PS and MIS to a depth of 36 feet below MLLW with aquatic disposal of the PS dredged material at the San Pablo Bay (SF 10) site and land disposal of the MIS dredged material on Island No. 1 within an area known as the Cullinan Ranch located immediately northwest of Mare Island Naval Shipyard (reference Plate 5).

3.09 Additional alternatives initially considered but then rejected are discussed below:

3.10 Alternate Project Site. Mare Island and Puget Sound Naval Shipyards are the only west coast facilities that can perform repair and overhaul work on SSN 688 Class submarines. Larger and deeper draft ships, however, are assigned to Puget Sound Naval Shipyard and therefore, this heavy workload precludes assignment of all SSN 688 Class submarine work to that facility. Accordingly, Mare Island Naval Shipyard is considered the only viable location for repair and overhaul work on the Pacific Fleet's SSN 688 Class submarines.

3.11 Alternate Types of Mechanical and Hydraulic Dredging.

The alternate types of mechanical dredging such as bucket and dipper dredges are not reasonable and feasible alternatives due to either the unavailability of dredging equipment or utilization of dredging equipment at a significant level below optimum capability. The alternate type of hydraulic dredge, plain suction pipeline, is not a viable alternative as the dredge plant design is too small to perform the required dredging work and the use of multiple dredges would result in significant increased costs.

3.12 Alternate Dredged Material Disposal Sites.

a) Aquatic Sites. The alternate dredged material aquatic disposal sites such as the designated San Francisco Bay disposal site near Alcatraz Island (SF 11) (reference PN 78-1) and the Environmental Protection Agency (EPA) interim designated 100-fathom disposal site located approximately 30 miles southwest of the Golden Gate near the Farallon Islands are not considered reasonable and feasible alternatives due to the increased distance to transport the dredged material and corresponding higher costs associated with the longer haul. In addition, the 100-fathom disposal site is located within the recently designated Pt. Reyes-Farallon Islands marine sanctuary and cannot be used for dredged material disposal. An investigation by EPA, Region IX, to replace the 100-fathom site is presently underway.

b) Land Sites. Land disposal of dredged material on the Navy's Skaggs Island, as well as the existing Mare Island land disposal site, was analyzed in a study conducted by the Navy entitled Final Report Engineering Concept Study Dredge Spoils Disposal Facility, Skaggs Islannd, California, April 1975. The purpose of this study was to address alternative systems for land disposal of dredged material from all Navy activities in the San Francisco Bay. These alternative systems were compared on economic, environmental, and operational bases. Considering that the study was based on a specific design quantity (i.e. 1,360,000 cubic yards per year over a 20 year period) of annual Navy maintenance dredging, land disposal of dredged material via pipeline on Skaggs Island as compared to land disposal on Mare Island via pipeline was not identified as the preferred alternative due to environmental and economic considerations. The filling of the Skaggs Island area would represent a significant and irretrievable loss since the area has the potential to be restored to a marshland if and when Navy use of the site is no longer required. It is acknowledged that some minor amounts of filling would increase the potential for conversion of the subsided lands on Skaggs Island to high value marshlands. However, such a determination would require a detailed study of the reduced capacity of the site under a marsh restoration program. Also, a dredged material pipeline route to Skaggs Island from the northwest corner of Mare Island would be over 25,000 feet in length. Based on Corps experience with pumping dredged material over long distances, dredged material disposal on Skaggs Island would not be cost effective.

3.13 Based on a recent study (Geotechnical Investigation for Levee Improvements Mare Island, California by Peter Kaldveer and Associates, dated 8 June 1979) and further analysis by the Navy, Mare Island does not contain sufficient capacity to properly dispose of dredged materials from the deepening of Mare Island Strait. After pending levee improvements, the capacity of the existing dredge ponds at Mare Island would be about 6,500,000 cubic yards (cys). The volume of dredged material (in-situ) to be placed from deepening Mare Island Strait (1,500,000 cys.) and from the shipyard's annual maintenance dredging operation (500,000 cys.) could range from 2,000,000 cys. without considering maintenance associated with a deeper channel, to 3,500,000 cys. annually when maintenance is considered. The 3,500,000 cys. includes a worse case analysis of 1,500,000 cys. of dredged material associated with the maintenance of a deeper channel. Including water, the total annual dredged material disposal pond requirement would range from about 4,390,000 to 7,500,000 cys. For proper pond management, a volume equivalent to at least two times the volume of dredged material (in-situ) plus water or 8,780,000 to 15,000,000 cys. is required. Dredged material disposal pond management consists of depositing dredged materials, settlement of solids, discharge of decantant, disking and drying of solids and harvesting of the dried materials. Proper pond management is also required to meet water quality standards for the decantant discharged from the dredged material disposal ponds.

3.14 Decision Alternatives. The two decision alternatives available to the Corps are:

a. Denial of Permit - This corresponds to Planning Alternative Number 1.

b. Issuance of Permit - This corresponds to Planning Alternative Numbers 2-A, 2-B, 2-C, and 3.

3.15 SUMMARY AND COMPARISON OF SIGNIFICANT IMPACTS BY ALTERNATIVE.

3.16 Alternative #1 (No project).

Navigation

- unsafe navigable channels for Navy's SSN 688 Class vessel.
- potential for reduced capability in case of mobilization due to restricted movement.
- decrease in Shipyard employment.

3.17 Alternative #2-A (clamshell dredging with aquatic disposal).

a. Water Quality

- at dredging sites: increased turbidity in the upper and lower water column, greatest temporary reduction in dissolved oxygen.
- at disposal sites: least increase in turbidity, least amount of mud flow, most amount of mounding, temporary reduction in dissolved oxygen.
- resuspension and redistribution of heavy metals and chemicals, including pesticides. The contaminant levels do not exceed the state water quality objectives.
- short term reduction in euphotic zone resulting from turbidity.

b. Benthos

- removal, transportation, and relocation of benthos and epibenthos at dredge site resulting in mortality and covering/smothering of organisms at both the dredge and disposal sites. This method of dredging is not as violent on benthos in the transporting process as Alternative #2-C and causes the least adverse impact on benthos due to turbidity, fluid mud, and intermitted nature of operation.

c. Fish

- temporary adverse impact on respiratory structures (i.e. inhibition of respiratory exchange through clogging of gills and the abrasive action on gill filaments) and feeding processes.

- potential for covering/destruction of fish during disposal operation.

- interference with migration routes, however, adequate channels for fish passage would exist.

- least indirect impact on fish as a result of the effects of fluid mud, turbidity, and intermittent nature of operation.

d. Navigation

- provide safe navigable channels and allow for unrestricted movement and safe operation of new class of Navy vessel.

- provide capability for responding to all mobilization orders.

e. Employment

- allow for continued Shipyard employment levels.

3.18 Alternative #2-B (hopper dredging with aquatic disposal).

a. Water Quality

- at dredge sites: least amount of turbidity in lower water column, turbidity in upper water column due to shipboard overflow, disturbance to sediments from prop wash, and temporary reduction in dissolved oxygen.

- at disposal sites: turbidity, mounding and mud flow (greater than Alternative #2-A but less than Alternative #2-C), and temporary reduction in dissolved oxygen.

- resuspension and redistribution of heavy metals and chemicals, including pesticides. The contaminant levels do not exceed the state water quality objectives.

- short term reduction in euphotic zone resulting fromm turbidity.

b. Benthos

- same as Alternative #2-A.

c. Fish

- same as Alternative #2-A.

d. Navigation

- same as Alternative #2-A.

e. Employment

- same as Alternative #2-A.

3.19 Alternative #2-C (hydraulic cutterhead dredging with aquatic disposal).

a. Water Quality

- at dredge sites: increased turbidity only in lower water column, least temporary reduction in dissolved oxygen, overall least adverse impact.

- at disposal sites: greatest turbidity in upper and lower water column, maximum amount of fluid mud and resultant larger impact area since this operation is continuous, minor mounding, and temporary reduction in dissolved oxygen.

- resuspension and redistribution of heavy metals and chemicals, including pesticides. The contaminant levels do not exceed the state water quality objectives.

- short term reduction in euphotic zone resulting from turbidity.

b. Benthos

- same as Alternative #2-A with greater areal coverage of benthos due to fluid mud layer. Also, greatest adverse impact from turbidity and continuous nature of operation.

c. Fish

- temporary adverse impact on respiratory structures (i.e. inhibition of respiratory exchange through clogging of gills and the abrasive action on gill filaments) and feeding processes.

- interference with migration routes however, adequate channels for fish passage would exist.

- greatest indirect adverse impact on fish as a result of fluid mud, turbidity and continuous nature of operation.

d. Navigation

- same as Alternative #2-A.

e. Employment

- same as Alternative #2-A.

3.20 Alternative #3 (hydraulic cutterhead dredging with aquatic disposal for Pinole Shoal dredged material and land disposal for Mare Island Strait dredged material).

a. Water Quality

- at dredge sites: same as Alternative #2-C.

- at San Pablo Bay (SF 10) disposal site only: same as Alternative #2-C.

b. Benthos

- same as Alternative #2-C except magnitude of impact not as great due to land disposal of dredged material from Mare Island Strait.

c. Fish

- same as Alternative #2-C except magnitude of impact not as great due to land disposal of dredged material from Mare Island Strait.

d. Terrestrial Vegetation

- disposal of dredged material from Mare Island Strait would cover vegetation.

e. Wildlife

- disposal of dredged material from Mare Island Strait would disturb/destroy wildlife that feed in or inhabit the site.

f. Navigation

- same as Alternative #2-A.

g. Employment

- same as Alternative #2-A.

3.21 COMPARISON OF ALTERNATIVES

IMAPCT	ALTERNATIVES* #1	#2-A	#2-B	#2-C	#3
Hydrography	0	+	+	+	+
Topography	0	0	0	0	0
Sedimentation	0	0	0	0	0
Water Quality	0	-	-	-	-/0
Increased Salinity	0	0	0	0	0
Terrestrial Vegetation	0	0	0	0	0
Benthos	0	-	-	-	-
Fish	0	-	-	-	-
Wildlife	0	0	0	0	0
Navigation	-	+	+	+	+
Cultural Resources	0	0	0	0	0
Population & Employment	-	+	+	+	+

\+ Beneficial Impact

0 No Significant Impact

\- Adverse Impact

* The alternatives are: (#1) No Project; (#2-A) Clamshell dredging with aquatic disposal; (#2-B) Hopper dredging with aquatic disposal; (#2-C) Hydraulic cutterhead dredging with aquatic disposal; (#3) Hydraulic cutterhead dredging with aquatic disposal for Pinole Shoal dredged material and land disposal for Mare Island Strait dredged material.

3.22 Relationship to Environmental Requirements. A review of available land use plans, policies and regulations for the study area and adjacent lands was made to determine their relationship to the plan alternatives. Based upon this review as discussed in the following paragraphs and in Table 1, it appears the proposed deepening of Pinole Shoal and Mare Island Strait considered in Alternatives #2-A, #2-B, and #2-C would not conflict with any of these plans, policies, or regulations. Proposed deepening of Pinole Shoal and Mare Island Strait under Alternative #3 (disposal of Mare Island Strait dredged material on land at Island No. 1) may conflict with Executive Order 11988 (Floodplain Management).

TABLE 1

RELATIONSHIP TO ENVIRONMENTAL REQUIREMENTS

Appropriate Policies Regulations, Plans, Etc.*	Alternatives #1 (No Project)	#2-A, 2-B, 2-C (aquatic disposal)	#3 (land disposal)
Federal			
NEPA	A	A	A
E.O. 11988 (Floodplain Management)	D	D	A or B
E.O. 11990 (Wetland Protection)	D	D	A
Endangered Species Act of 1973	D	A	A
National Historic Preservation Act of 1966	D	D	A
Chief of Engineers Wetland Policy	D	D	A
E.O. 11593 (Cultural Resources)	D	A	A
Clean Water Act, as amended in 1977	D	A	A
Coastal Zone Management Act of 1972 as amended	D	A	A
Prime and Unique Agricultural Lands, CEQ Memorandum dated 11 August 1980	D	D	A
State			
State of California Wetland Policy	D	D	A
BCDC Plan	D	A	A
Local			
Solano County General Plan	D	A	A
Contra Costa County General Plan	D	A	A
City of Vallejo General Plan	D	A	A

*These items explained on following pages.

Legend: A = Full Compliance (Pending Review by Appropriate Agencies)
B = Partial Compliance
C = Noncompliance
D = Not Applicable

3.23 Executive Order 11988 (Floodplain Management). This policy states that Federal agencies must "avoid long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development whenever there is a practicable alternative ...". The land disposal site considered under Alternative #3 (i.e. Island No. 1) is protected by levees and susceptible to 100-year frequency tidal flooding. This undeveloped land is currently dry farmed. If dredged material was disposed on this land with the ultimate objective of developing these lands then a conflict with E.O. 11988 may exist. It is noted that the owner of the Island No. 1 Cullinan Ranch plans to develop the site. However, land disposal at this site with the ultimate objective of non-development (e.g. continued agricultural use, marsh restoration) would probably be in full or at least partial compliance with E.O. 11988.

3.24 Executive Order 11990 (Wetland Protection). This policy states that Federal agencies should avoid to the extent possible the long- and short-term adverse impacts associated with destruction or modification of wetlands. The agency shall also avoid undertaking and providing support for new construction (draining, dredging, channelizing, filling, diking, impounding, and related activities) located in wetlands, unless the agency head finds: (1) no practicable alternative, and (2) all practical measures have been taken to minimize harm to wetlands. Environmental, economic, and other pertinent factors may be taken into account.

3.25 Endangered Species Act of 1973, as Amended (16 USC Sec. 1533). The intent of this law is to protect plant and animal species designated as endangered or threatened by the U.S. Department of Interior and/or their critical habitat from activities which would further jeopardize such species' survival. No such impacts are expected to be caused by the proposed project.

3.26 National Historic Preservation Act of 1966 (80 Stat. 915, 16 USC Sec. 470). This act created the National Advisory Council to advise the President and Congress on matters involving historic preservation. In performing the above, the Council reviews and comments upon activities licensed by the Federal Government which would have effects upon properties listed in the National Register of Historic Places, or those eligible for listing. The most recent listing of the National Register of Historic Places has been consulted and no National Register property would be impacted by the proposed project (reference Cultural Resources section, paragraph 4.102 for further discussion).

3.27 Chief of Engineers Wetland Policy. This policy declares wetlands to be vital areas constituting productive and valuable public resources. Alteration or destruction of wetlands is discouraged as contrary to the public interest. Wetland functions considered important to the public interest are delineated in the July 19, 1977 Federal Register. Cumulative effects of small changes in wetlands often result in major wetland impairment. Therefore, Federal projects affecting a particular wetland site will be evaluated with respect to the complete and interrelated wetland area. No construction activity will occur in wetlands delineated as important to the public interest, unless the

District Engineer concludes the benefits of the alteration outweigh the damage to the wetlands and the alteration is necessary to realize the benefits. The District Engineer must demonstrate the need to locate the project in the wetland and must evaluate the availability of feasible alternative sites.

3.28 Executive Order 11593 (Preservation and Enhancement of Cultural Resources. This executive order directs Federal agencies to assume leadership in preserving and enhancing the Nation's cultural heritage to survey and nominate to the National Register historic properties under their jurisdiction, to refrain from impairing historic properties under their control and to initiate measures to ensure that their programs and policies contribute to the preservation and enhancement of non federally owned historic resources. (Reference Cultural Resources Appendix, paragraph 4.102).

3.29 Clean Water Act, as Amended in 1977. The objective of the 1977 Amendments to the Clean Water Act (P.L. 95-217, 91 Stat. 1600, 33 USC 1251 et seq) is to restore and maintain the chemical, physical and biological integrity of the Nation's waters. Section 404(b)(1) of the Clean Water Act, as amended in 1977, requires that the Corps evaluate the impacts of the discharge of dredged or fill material into waters of the United States (U.S.) in order to make specified determinations and findings.

3.30 Coastal Zone Management Act of 1972, as Amended. The objectives of this Act (P.L. 92-583, 86 Stat 1280, 16 USC 1451 et seq, as amended by PL 94-370, 90 Stat 1013) are to describe the obligations of all agencies, who are required to comply with the Federal Consistency Determination requirements of this Act, to ensure that Federal Consistency Determinations are related to the objectives and policies of approved State Coastal Management Programs and to provide appropriate means of coordinating these efforts among State and Federal agencies. The Corps has determined that the discharge of dredged material as proposed in this EIS would affect the California Coastal Zone. Pursuant to 15 CFR Part 930.37, the Corps has determined that the proposed activity is consistent to the maximum extent practicable with the approved California Coastal Zone Management Program-the San Francisco Bay Plan (reference paragraph 3.33). This determination will be submitted under separate cover to the San Francisco Bay Conservation and Development Commission.

3.31 Analysis of Impacts on Prime and Unique Agricultural Lands, CEQ Memorandum dated 11 August 1980. This memorandum provides guidance to Federal agencies to preserve highly productive agricultural land. These lands are classified as prime and unique. The memorandum defines prime and unique agricultural land as cropland, pastureland, rangeland, forest land or other land, but not urban built-up land, which is capable of being used as prime and unique agricultural land as defined by the Department of Agriculture. Prime agricultural lands are those whose value derives from their general advantage as cropland due to soil and water conditions; unique agricultural lands are those whose value devices from their particular advantages for growing specialty crops. Primary and secondary impacts on these lands must be assessed in environmental reports. These lands should not be irreversibly

converted to other uses unless other national interests override the importance of preservation or otherwise outweigh the environmental benefits derived from their protection. The soil on Island No. 1 is out of the capability range considered important for prime agricultural land. The U.S. Department of Agriculture Soil Conservation Service in a letter dated 6 May 1981 stated "No prime agricultural land will be affected by this proposed project". (Reference Appendix E).

3.32 State of California Wetland Policy. This policy recognizes the value of marshlands and other wetlands. Basically, the Resources Agency and its various departments will not authorize or approve projects that fill or otherwise harm or destroy coastal, estuarine, or inland wetlands. Exceptions may be granted if all the following conditions are met: (1) project is water dependent; (2) no feasible, less environmentally damaging alternative is available; (3) the public trust is not adversely affected; and (4) adequate compensation is part of the project. Compensation measures must be in writing, and long-term "wetland habitat value" of involved project and mitigation lands must not be less after project completion.

3.33 Bay Conservation and Development Commission (BCDC) Bay Plan. This regional plan establishes policies formulated by the McAteer-Petris Act permitting bay fill in San Francisco Bay. The Bay Plan provides a comprehensive and enforceable basis for protecting the Bay as a natural resource benefiting both present and future generations, and developing the Bay and its shoreline to the highest potential with a minimum of Bay filling. The following policies of the Bay Plan would be satisfied by the proposed project:

a. Water Pollution - Policy No. 1: Removal of material from the Pinole Shoal and Mare Island Strait Federal navigation channels with disposal of the dredged material at the designated Bay aquatic sites and upland area would not reduce the surface area or water volume of the Bay. Also, the proposed project would not reduce fresh water inflow into the Bay and would not reduce the remaining marshes and mudflats around the Bay.

b. Water Surface Area and Volume - Policies No. 1 and 2: The proposed project would not reduce the surface area or water volume of the Bay. The removal of material from the Pinole Shoal and Mare Island Strait Federal navigation channels would result in increased water depths and would tend to increase water circulation.

c. Dredging - Policies No. 1, 3, and 4: Sediments from the proposed project would be disposed at the designated Bay aquatic disposal sites and an upland disposal site. The Bay aquatic disposal sites have been selected to minimize dredged material disposal impacts on the ecology of the Bay. The aquatic disposal sites have been selected so that the maximum possible amount of dredged material would be carried out the Golden Gate on ebb tides. No artificial islands would be created in the Bay with the dredged material. The channels of the proposed project have been designed so as not to undermine the stability of any adjacent dikes or fills.

3.34 The proposed deepening of Pinole Shoal Channel and Mare Island Strait is consistent with the water quality, water surface area and volume, and dredging policies of the Bay Plan.

3.35 Solano County General Plan. The County General Plan, developed by individual planning areas, shows no specific area as being planned for port facility development. The policies of the Southeast Planning Area stipulate that harbor facilities are encouraged with emphasis on provisions for year round employment that does not adversely affect the environment.

3.36 Contra Costa County General Plan. The County General Plan does not specifically address dredging activities. However, the policy of the County Board of Supervisors is to generally promote waterborne commerce and the associated required dredging of navigation channels.

3.37 City of Vallejo General Plan. The City of Vallejo, in their General Plan, has encouraged redevelopment of the waterfront area of Mare Island Strait. The Plan Map of the General Plan designates an area fronting Mare Island Strait to the south as an "Employment Center". The text of Vallejo's General Plan indicates that the industrial use of the area is "Vallejo's principal opportunity for deep water-related industry".

4.00 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

4.01 Setting and Project History. Pinole Shoal Channel and Mare Island Strait are Congressionally authorized Federal navigation projects. Pinole Shoal Channel was first authorized to a depth of 30 feet below MLLW by the RHA of 27 February 1911. Due to increased navigation traffic which utilized deeper draft vessels, Pinole Shoal Channel was deepened to 35 feet below MLLW and widened to 600 feet under the River and Harbor Acts of 8 August 1917 and 21 January 1927. The existing channel dimensions consist of a channel 35 feet deep (MLLW), 600 feet wide, and about 8 miles in length (reference Plate 1). Pinole Shoal Channel provides the link between Carquinez Strait and Central San Francisco Bay and is used by deep draft commercial and Naval vessels. Since 1957 the dredged materials from Pinole Shoal have usually been disposed of at the San Pablo Bay (SF 10) aquatic disposal site.

4.02 The Mare Island Naval complex is located 25 nautical miles northeast of the City of San Francisco in the North Bay subregion of the San Francisco Bay Area. Mare Island is located within the jurisdiction of Solano County and is adjacent to the City of Vallejo but separated physically from Vallejo by the Napa River (referred to as Mare Island Strait along the length of Mare Island).

4.03 In 1858 Mare Island Shipyard launched its first ship. Between 1858 and 1970 513 ships, ranging from landing craft and destroyers to battleships and Polaris submarines have been launched from the Shipyard. Currently the primary mission of the Mare Island Naval complex is the Shipyard's function of maintaining, overhauling, and refueling ships.

4.04 The first of a series of navigation improvements in Mare Island Strait was begun by the Department of the Navy in 1892 with subsequent improvements undertaken by the Corps under the River and Harbor Acts of 13 June 1902, 27 February 1911, 8 August 1917, 21 January 1927, 20 June 1928, and 2 March 1945. The existing authorized dimensions (Plate 4) include: a channel 700 feet wide through Mare Island Strait, flaring to a turning basin generally 1,000 feet wide from former Dike No. 6 to within 75 feet southerly from the causeway between Vallejo and Mare Island, 30 feet below MLLW at the northerly end where the project depth is 26 feet below MLLW; for dredging two approach areas 20 feet below MLLW to the waterfront at Vallejo and South Vallejo (these two approach areas were never constructed and are considered inactive); and for dredging two approach areas to the Navy yard piers at the south end of Mare Island (the configuration of these piers does not require dredging of the approach areas by the Corps). In addition, the westerly 600 foot wide section of the turning basin is maintained to a depth of 32 feet below MLLW in order to accommodate vessel movement to and from the Naval Shipyard. This additional two feet of channel depth was previously maintained by the Navy and is now maintained by the Corps for national defense purpose as authorized by Section 117 of the RHA of 13 August 1968. Historically the semi-annual dredging of an average 2,230,000 cubic yards has been performed by the Corps' hopper dredge with aquatic disposal at the Congressionally authorized Carquinez Strait (SF 9) site.

4.05 The elements of air quality, noise, wave action, water circulation, tidal conditions, hydrology, government and civic activity, desirable community and regional growth, community cohesion, housing and housing availability, aesthetic quality, recreation, public health and safety, transportation and traffic, public facilities and services, and local government finance have not been identified as issues requiring detailed analysis in this EIS.

4.06 The following sections in paragraph 4 discuss those elements of the proposed project which require detailed analysis.

4.07 HYDROGRAPHY

4.08 Present Conditions

4.09 Alternatives #1 thru #3. San Francisco Bay has extensive natural areas of deep and shallow water which are augmented by dredging. A recent hydrographic survey of Pinole Shoal Channel indicates existing depths of 36 feet below MLLW or greater for approximately 85% of the channel length. The remaining channel reaches range in depth from 33 to 35 feet below MLLW. Pinole Shoal Channel is maintained to a depth of 35 feet below MLLW. The San Pablo Bay (SF 10) open water disposal site ranges in depth from 38 to 40 feet with an average of 39 feet. Mare Island Strait depths, based on recent surveys, range from a few feet below MLLW along the eastern perimeter of the Strait to over 37 feet below MLLW within the Navy channel boundary. The Navy channel is currently maintained to a depth of 32 feet below MLLW. The Carquinez Strait (SF 9) open water disposal site ranges in depth from 28 to 56 feet with an average depth of 42 feet.

4.10 Impacts

4.11 Alternative #1. Under the no project alternative, the existing natural and maintained channel depths at Pinole Shoal and Mare Island would be unchanged.

4.12 Alternatives #2 and #3. These proposed project alternatives would increase the maintained depths at Pinole Shoal by one foot (from 35 to 36 feet below MLLW) and at Mare Island Strait by four feet (from 32 to 36 feet below MLLW). Given the high current velocity at the San Pablo Bay (SF 10) and Carquinez Strait (SF 9) open water disposal sites, no net accumulation of dredged material sediments has been detected since disposal operations at these sites were initiated. Therefore, depths at these open water disposal sites are not expected to change as a result of the proposed project. The sediments are dispersed within the Bay system.

4.13 TOPOGRAPHY

4.14 Present Conditions

4.15 Alternatives #1 thru #3. Mare Island is technically a peninsula attached to the mainland by diked wetlands. Mare Island is enclosed by bay waters on three sides: Mare Island Strait on the east, Carquinez Strait on the south, and San Pablo Bay on the west. Most of Mare Island is relatively flat ranging from near sea level in elevation at the extreme north end to 40 feet above sea level in the south-central area. The southern hills rise to a height of 275 feet. Of Mare Island's 5,657 total acres, approximately 2,582 acres consist of dry land and 3,075 acres consist of wetlands.

4.16 Island No. 1 - The privately owned Cullinan Ranch comprises approximately 1,500 acres of former marshland now protected by levees and surrounded by tidal sloughs. The interior of the island is not influenced by tidal action. This site is located in Solano County except for approximately 150 acres in the northwestern corner which is located in Napa County. Island No. 1 is bounded by South Slough to the north, Dutchman Slough to the east, and Highway 37 to the south and west. The island is low, having experienced subsidence, and nearly flat with spot elevations ranging from -1 foot MSL to 8 feet MSL. The interior is drained by canals leading to pumps which discharge over the levee into the adjacent slough.

4.17 Impacts

4.18 Alternatives #1, #2-A, #2-B, and #2-C. No significant impacts are anticipated.

4.19 Alternative #3. Land disposal on Island No. 1 - Cullinan Ranch of dredged material from the deepening and maintenance of Mare Island Strait would increase the elevation of the site. The amount of land area affected would be dependent upon the design of the land disposal receiving system.

4.20 SEDIMENTATION

4.21 Present Conditions. Sedimentation in San Pablo Bay-Carquinez Strait has been described in Appendices B and E of the Dredge Disposal Study. Most sediments entering San Pablo Bay originate from the Sacramento-San Joaquin River systems. Channel areas have shown consistent scour whereas shallow areas in San Pablo Bay and areas along the shoreline of the Bay and Carquinez Strait have historically experienced heavy sedimentation.

4.22 Mare Island Strait experiences high rates of shoaling and consequently requires a large amount of maintenance dredging to retain channel depth. Two shoaling periods occur at Mare Island Strait. During spring and summer months suspended solids are brought back from San Pablo Bay into Carquinez Strait by bottom flood currents. Some sediments are trapped in Mare Island Strait where due to tranquil conditions they settle to the bottom. Shoaling also occurs in winter when Delta outflows heavily ladden with sediment directly enter the Mare Island Strait channel.

4.23 Since 1960 the Corps has dredged an average of 361,000 cubic yards of shoaled material from Pinole Shoal channel annually with disposal at the San Pablo Bay (SF 10) disposal site. In that same 21-year period the Corps dredged an average of 2,230,000 cubic yards of shoal material per year from the Mare Island Strait channel with disposal at the Carquinez Strait (SF 9) disposal site. The Navy dredges about 500,000 cubic yards of material per year with disposal on land.

4.24 Impacts.

4.25 Alternative #1. It is assumed shoaling rates would continue as in the past and that maintenance dredging of Pinole Shoal Channel (every other year) and Mare Island Strait (semi-annually) would be required to remove shoaled material and provide safe navigable depths for deep draft vessels.

4.26 Alternatives #2-A, #2-B, #2-C. Deepening of Pinole Shoal and Mare Island Strait would require the removal of an estimated 1,600,000 cubic yards (cys.) of material (100,000 cys. from Pinole Shoal and 1,500,000 cys. from Mare Island Strait). Shoaling in Mare Island Strait is expected to continue in two distinct patterns. During winter conditions, sediments are brought directly into the Strait with outflows from the Delta. During summer conditions, sediments which had been transported into San Pablo Bay are resuspended and returned to Mare Island Strait. Review of past dredging records and delta outflows indicated no detectable pattern although a greater Delta outflow did show some increase in dredging quantities in Mare Island Strait. Patterns of sediment circulation with various levels of Delta outflow rather than a direct correlation between transport of sediments and Delta outflow probably dictates dredging quantities.

4.27 A general rule is that increased maintenance dredging quantities are directly proportional to the increase in channel bottom surface area and the ratio of the square of the new depth divided by the square of the old depth. Assuming an increase of 25% of the bottom area subject to shoaling and an increase depth from -32 feet to -36 feet MLLW, the estimated annual increase in dredging quantities is 1.5 million cubic yards. The present average annual

dredging is 2.3 million cubic yards. Because of the lack of trends in the dredging record, the 1.5 million is considered to be on the high side. If no increase in bottom is assumed and no increase is associated with a residual shoaling quantity (sediment movement during the summer and fall) of about 1 million cubic yards, the increased dredging quantity is estimated to be 0.4 million cubic yards. Based on the shape of the shoals occurring in the Mare Island Strait channel, the lack of detectable patterns in dredging records and that no major change will occur with the summer circulation patterns because of a deeper channel, the increased dredging quantity of 400,000 cubic yards is considered a more probable estimate. This means that Corps maintenance dredging of Mare Island Strait is estimated to increase from an annual quanity of 2,230,000 cys to 2,630,000 cys. No appreciable increase in maintenance dredging quanities over the average annual quanity of 361,000 cys. is expected at Pinole Shoal.

4.28 Alternative #3. Dredging impacts would be the same as those discussed in alternatives #2-A, #2-B and #2-C above. Land disposal of 1.5 million cubic yards of initial dredging would reduce the amount of sediments available for resuspension and possible return to the dredge sites. Annual maintenance dredging requirements would increase by 400,000 cubic yards at Mare Island Strait; no appreciable increase is expected at Pinole Shoal Channel.

4.29 WATER QUALITY

4.30 Present Conditions

4.31 Alternatives #1 thru #3. The San Francisco Bay System may be divided into two physical regimes-sediment and water. The physical and chemical properties of these regimes are interrelated and closely associated. Appendix B of the Dredge Disposal Study discusses the sediment aspect of the bay system and Appendix C of the same study discusses Bay water quality as related to dredging and disposal impacts.

4.32 Standard estuarine water quality parameters include salinity/conductivity, temperature, pH, dissolved oxygen, suspended solids, heavy metals, petroleum hydrocarbons and pesticides. The salinity of water is important in maintaining the proper osmotic relationship between the protoplasm of an organism and the water and chemical balance between the water and sediments. Changes in salinity levels determine the composition of species that inhabit a region. San Pablo Bay (which includes Pinole Shoal, Mare Island Strait and the open water disposal sites at San Pablo Bay (SF 10) and Carquinez Strait (SF 9) is less saline at its eastern or upper end than at the western end. Also, salinity is generally lowest during the rainy season (January through March) and highest in late summer (September and October).

4.33 Temperature is important due to its effect on the rate of metabolism, growth and reproductive physiological processes of plants and animals. Temperatures in San Pablo Bay are relatively constant.

4.34 The pH is a measure of the hydrogen ion concentration in the water. The practical pH scale extends from 0 (very acidic) to 14 (very alkaline). The pH affects the rate of chemical reaction and the activity coefficients. Maintaining the proper pH is important for the maintenance of life. pH values for San Pablo Bay are not outside the typical seawater pH range.

4.35 Oxygen is indispensable to life of most organisms. The concentration of oxygen in water is much less than in the atmosphere (9mg/l in water vs over 200 mg/l in air) and thus a reduction in the environment's level is more critical to aquatic organisms than air breathing organisms. Mean dissolved oxygen concentrations increased in San Pablo Bay between the early 1960's and mid 1970's. This improvement can be attributed to the increased treatment of wastewaters prior to discharge into Bay waters. The average dissolved oxygen concentrations in San Pablo Bay are well above the concentration level required for respiration by estuarine organisms.

4.36 Turbidity and transparency provide a relative indication of the quanity of suspended material in water. Transparency is typically a measure of surface turbidity. Information on turbidity, transparency, and suspended solids is important for assessing biological effects which result from sediment loading of the water column. Turbidity and suspended solid loads in San Pablo Bay are seasonally influenced by the suspended sediment carried in the freshwater outflows from the Delta.

4.37 Water quality data as determined during 1970 - 1975 for San Pablo Bay are presented below:

Stanford Research Institute &
Environmental Protection Agency STORET
Water Quality Data
1970 - 1975

Parameter		San Pablo Bay
salinity (ppt)	max	23.5
	min	1.5
	mean	11.5
temperature (°C)	max	20.0
	min	9.8
	mean	14.4
dissolved oxygen (mg/l)	max	10.2
	min	6.7
	mean	8.6
pH (standard units)	max	8.0
	min	7.3
	mean	7.7
suspended solids (mg/l)	max	123*
	min	33*
	mean	77*
turbidity (NU** & FTU***)	max	390
	min	10
	mean	129

*Data from EPA STORET system, all others from Stanford Research Institute Survey (Biological Community, Appendix D of the Dredge Disposal Study)

**NU = nephelometric units
***FTU = Formazine turbidity units

SOURCE: Appendix C - Water column, Dredge Disposal Study San Francisco Bay and Esturary, April 1976.

4.38 Sediments dredged in Mare Island Strait consist of approximately 60% (by weight) clay size particles; 30% silt, and 10% fine sand. Organic matter in the sediment includes land erosion debris and some peat material from Delta erosion.

4.39 Appendix B of the Corps Dredge Disposal Study assesses bulk contaminant levels in sediments of the San Pablo Bay-Carquinez Strait area for trace metals (mercury, lead, zinc, cadmium, copper), organics (volatile solids, Kjeldahl nitrogen, oil and grease) and chemical oxygen demand. Generally, the surface sediments have higher levels of the nine contaminants than the deeper sediments. Although vertical distribution of contaminants in the San Pablo Bay-Carquiez Strait area is erratic, the highest contaminant levels tend to correspond to the finer sediments and the lower contaminant levels correspond to the coarser sediments. The coarsest sediments, are also associated with the greatest energy deposition areas in the natural channel and maintained navigation channel of San Pablo Bay. Where the energy of the current decreases, the surface sediments tend to be finer and have higher contaminant levels.

4.40 The mean concentrations of contaminants in the San Pablo Bay-Carquinez Strait area are given in Table 2. Dividing the area into five sections, varying conditions of the sediments are discussed as follows: (1) Mare Island Strait and the northern shallows of San Pablo Bay are the most contaminated of the San Pablo Bay-Carquinez Strait area. The sediments of Mare Island Strait tend to be the higher of the two in contaminant levels; however, the northern shallows of San Pablo Bay have higher mercury levels. (2) The southern shallows of San Pablo Bay have lower contaminant levels than the northern shallows except for chemical oxygen demand. Levels tend to be higher and are more variable than the natural channel. (3) In the channel margins of Carquinez Strait, contaminant levels tend to be high even though the sediments are relatively coarse. (4) Sediments at the entrance to Carquinez Strait are generally coarse, the contaminant levels are low and are uniformly distributed with channel depth. (5) The lowest contaminant levels in the San Pablo Bay-Carquinez Strait area are found in the natural and maintained channel. Contaminant levels are higher at the western end of the channel due to the finer sediments.

TABLE 2

MEAN CONCENTRATION OF CONTAMINANTS IN SURFACE AND DEEPER SEDIMENTS IN SAN PABLO BAY-CARQUINEZ STRAIT AREA

Parameter	Mean Concentration (ppm)		%Surface Greater than Sub-Surface
	Surface 0-0.6 Feet	Sub-Surface Greater Than 0.6 Feet	
Lead	57.50	32.70	43
Zinc	135.00	105.80	22
Mercury	1.07	0.68	37
Cadmium	0.89	0.72	19
Copper	41.10	33.00	20
Oil-Grease	700.00	450.00	36
Volatile Solids x 10^4	6.13	5.89	4
Chemical Oxygen Demand x 10^4	3.31	3.34	0
Total Kjeldahl Nitrogen	1,100	1,100	0

4.41 Impacts

4.42 Alternative #1: No Change

4.43 Alternatives #2 and #3: All three proposed dredging methods would increase turbidity over background levels in the lower water column (bottom 2 meters) at the dredge sites as the bottom sediment is disturbed by the cutting device of the draghead, cutterhead or bucket. Bottom sediments are also disturbed by the prop wash of the hopper dredge. In addition, clamshell and hopper dredging tend to increase turbidity over ambient levels in the upper water column. With the clamshell, turbidity is caused by sediment being washed from the bucket as it is raised through the water. Turbidity occurs with a hopper dredge when the supernatant liquid in the hoppers is allowed to overflow into the water to increase the density of the mud slurry in the hoppers and thus obtain an economic load. Monitoring studies (reference Dredge Disposal Study Appendix C - Water Column and the Composite EIS)of Pinole Shoal/San Pablo Bay and Mare Island Strait/Carquinez Strait have determined that both the dredging and disposal operations affect dissolved oxygen concentrations (DO). The effects of dredging are less severe than those of the disposal operation. Dredging causes a temporary decrease of about two ppm in DO at the surface of the dredge site with background levels reestablished within two minutes. DO reductions in the lower water column of as much as four ppm with background concentrations reestablished after about eight minutes have been recorded.

The duration of a reduction in DO is controlled by a combination of the following factors operating simultaneously. While the "oxygen deficient" dredged material is in suspension its demand is met by available oxygen in the water column. This demand can be satisfied and ambient levels can reestablish; or the material can settle (reducing the contact time) before the demand is totally exerted; or flushing by currents can disperse the dredged material thus diluting the sediment concentration and reducing the duration of the demand. The hopper dredge since it is in constant motion impacts discrete dredge locations for only a short period of time however, its effects range over a wide area. The clamshell or hydraulic cutterhead dredge impact only a limited area at one time but the effects are exerted continuously. Dissolved oxygen reductions caused by the continual introduction of oxygen consuming materials can last the duration of the project. Salinity/conductivity, temperature and pH of the water are not changed significantly during dredging.

4.44 An important factor to consider when dredging the Pinole Shoal area to a greater depth is the potential for an increase in saltwater intrusion into Suisun Bay and the Delta. Saltwater intrusion has been a recognized problem as Delta water is used for a variety of beneficial purposes (i.e. municipal and industrial, agricultural as well as instream uses such as fish and wildlife).

4.45 Hydrographic surveys conducted in November 1980 at Pinole Shoal Channel indicated channel depths of 36 feet below MLLW or greater within the center half of the channel. Biennial dredging maintains Pinole Shoal at 35 feet MLLW. Historically more than half the reaches to be maintained have exceeded the depths of the proposed Navy deepening project. The proposed Navy deepening of Pinole Shoal would only require dredging within the left and right quarters of the channel. The middle of the existing Pinole Shoal Channel is well below the proposed Navy project depth of 36 feet MLLW.

4.46 The Corps' hydraulic model of the San Francisco Bay and Delta has been a device for testing salinity intrusion data associated with Bay channel improvements. This model was used in tests performed for the John F. Baldwin Ship Channel Study in analyzing the Pinole Shoal Channel at a depth of 45 feet MLLW and width of 750 feet. These test methods and results have been reviewed and analyzed by a model test advisory panel of recognized experts in the field of hydraulic model testing. In the opinion of this advisory panel the San Francisco Bay - Delta hydraulic model is the best engineering tool available to test salinity intrusion changes associated with channel improvements. However, the marginal channel improvements associated with dredging to the Navy's proposed Pinole Shoal Channel depth of -36 feet MLLW would induce such slight salinity intrusion changes that use of the model is not believed feasible to determine the magnitude of these changes.

4.47 Based upon the above, the proposed Navy deepening of Pinole Shoal Channel is not expected to cause a noticeable increase in saltwater intrusion into the Suisun Bay/Delta system.

4.48 In general, "the actual physical impacts associated with any dredging operation regardless of the type of equipment utilized is primarily dependent on the nature of the material being moved and the oceanographic and hydrographic characteristics of the project area. The length of time particles remain in suspension following disturbance is dependent on their physical properties, the salinity of the water, and the velocity of the water mass in which they are suspended, not the nature of the disturbance, i.e. type dredging equipment." (Wakeman 1975).

4.49 Aquatic Disposal Impacts: In accordance with the Supplemental Regional Procedures for Evaluating Discharges of Dredged Material into waters of the United States (Public Notice 78-1 issued by the U.S. Army Corps of Engineers, San Francisco District) dated 30 July 1979, sediment samples were extracted from the Pinole Shoal and Mare Island Strait dredge sites and subjected to elutriate analysis in order to measure potential contamiant releases from the aquatic discharge of the dredged material. Contaminants tested were oil and grease, mercury, cadmium, lead, copper, zinc, polychlorinated biphenyls (PCB's), and total identifiable hydrocarbons (TIHC). The values for these contaminants were compared to the appropriate California State Water Quality objectives. Analysis of the sediment test results indicates that the sediment material from the proposed dredging project does not exceed the state water quality criteria for disposal of dredged material at the San Pablo Bay (SF 10) and Carquinez Strait (SF 9) open water disposal sites. Elutriate testing was also performed for residual petroleum hydrocarbons for which state water quality objectives have not been established. There were no residual petroleum hydrocarbons detected at either the Pinole Shoal and Mare Island dredge sites or the respective aquatic disposal sites. Appendix C of this EIS provides the sediment testing results.

4.50 Physical effects of the three aquatic methods differ. Table 3 presents an estimate of the percent of the disposed sediment material which is expected to mix with the water column due to different disposal methods. (The material to be dredged from Mare Island is silty-clay, and the material to be dredged from Pinole Shoal is fine sand).

TABLE 3

EFFECTIVE SEDIMENT VOLUME EXPECTED TO MIX WITH WATER COLUMN
(Percent)

	Sandy (greater than 0.07 millimeters (mm))	Silty (between 0.074 and 0.005 mm)	Clayey (less than 0.005 mm)
Upper Water Column			
Pipeline with Surface Release	20	70	60
with Submerged Release	10	40	30
Hopper Dredge	10	5	2
Clamshell with Barge	10	3	1
Lower Water Column (bottom 2 meters)			
Pipeline with Surface Disposal	20	100	90
with Submerged Disposal	20	100	90
Hopper Dredge	20	70	50
Clamshell with Barge	20	60	10

Source: Sustar, 1978.

4.51 Alternative #2-A. Disposal of Mare Island Strait dredged material would have only a minor impact on the upper water column. (Only 1% of the material is expected to mix with the upper water column). This alternative would cause the greatest mounding of dredged material on the bottom. Erosion of the mounded material would be long term. Formation of a fluid mud layer on the bottom would be the least significant with this disposal alternative. Fluid mud is a condition which can occur with dredged material composed predominantly of clays. A mud layer can form on the sediment surface which has sufficient strength to resist the shear and friction forces of the water current and can thus move as a density current or mud flow independent of current action. Gravity is usually the dominant factor attracting the flow away from the discharge point.

4.52 The effect of sediment disposal on the concentrations of dissolved oxygen in the water depends upon the concentration of the suspended dredged sediments in the water column and the amount of organic material in the sediments. As shown by Table 3, this alternative would suspend the least amount of material dredged from Mare Island Strait in the water column of the three alternative aquatic disposal methods. The least reduction in dissolved oxygen is anticipated.

4.53 No significant impact upon pH, salinity or temperature is expected to occur with any of the aquatic disposal methods.

4.54 The material to be disposed in San Pablo Bay (SF 10) is predominantly fine sand. Approximately 10% of the material is expected to mix with the water column. Previous studies of disposal of sandy material have indicated that disposal causes an increase in the concentration of dissolved oxygen by actual disturbance of the water, and the trapping of oxygen within the sediments during transport in the barge or hopper.

4.55 Alternative #2-B. Two percent of the material proposed to be disposed at Carquinez Strait (SF 9) is expected to mix with the upper water column. This alternative would cause more mounding of the disposed material on the bottom. The formation of a fluid mud layer on the bottom is more likely with this alternative than with a clamshell.

4.56 Reduction in dissolved oxygen concentration will vary with the amount of suspended dredged material. Reductions in DO concentrations of approximately two ppm and lasting two minutes at the surface of the disposal site have been recorded. Sediment disposal in the bottom water column can cause significant reductions in DO concentration levels with each release. Reductions of up to six ppm in DO have been observed (reference Dredge Disposal Study - Appendix C). However, ambient DO concentration levels were established after an average of three to four minutes. No significant change is expected in pH, temperature or salinity.

4.57 Disposal at the San Pablo Bay (SF 10) site would have similar effects to those discussed under the clamshell Alternative #2-A.

4.58 Alternative #2-C. This disposal method would cause the greatest mixing of the disposed sediments with the water column at Carquinez Strait (SF 9). Ninety percent of the material is expected to mix with the lower water column and thirty percent will mix with the upper water column. The greatest initial reduction in DO concentration would be expected with this alternative. There is some minor mounding of material with this method. Formation of a fluid mud layer is greatest with pipeline disposal.

4.59 With sandy sediments this alternative mixes the same percentage of sediments with the surrounding layers as the other disposal methods, however no oxygenation of the water occurs. No significant change in pH, salinity or temperature is expected.

4.60 Alternative #3. The dredging impacts of this alternative have already been described. The impact of land disposal on water quality would be limited to the discharge of the supernatant liquid from the disposal site into Dutchman's Slough. The discharge would require certification by the California Regional Water Quality Control Board. Certification usually requires that the discharge be monitored and controlled to guarantee that the effluent does not contain greater than one part per thousand suspended particulates, does not depress dissolved oxygen concentrations in the surrounding water by more than 10% from normal levels and does not cause pH of the receiving waters to change by more than 0.2 units from that occuring naturally.

4.61 TERRESTRIAL VEGETATION

4.62 Present Conditions.

4.63 Alternatives #1 and #2. As diked and filled historic marsh, the Mare Island study area has basically two types of vegetated areas. Remnants of former salt marsh vegetation can be found along the peripheral areas outside the dikes. The disturbed area behind the dikes is generally grassland, used either for agriculture (oats) or naval base development. Annual weeds and grasses and introduced shrubs can be found in the housing areas, base yard and upland agricultural areas. Some introduced trees are found around residential sites in the area.

4.64 Alternative #3. A preliminary field inspection of the Island No. 1 - Cullinan Ranch land disposal site was made in March 1981. Due to the time of year, a detailed vegetative study was not part of this inspection. These agricultural lands, in addition to cultivated crops, show an abundance of annual grasses, mallow, sweet fennel and mustards. The continued cultivation of oats disturbs any establishing vegetation; therefore surviving species tend to be adapted to this continual disturbance. The cultivated areas and associated vegetation of Island No. 1 - Cullinan Ranch provide habitat for some wildlife, especially birds.

4.65 Impacts.

4.66 Alternatives #1, #2-A, #2-B and #2-C. No significant impacts are anticipated.

4.67 Alternative #3. Filling the proposed disposal site would cover vegetation and significantly impact wildlife temporarily until revegetation of the area. The eventual land use of the filled disposal site would have secondary impacts on terrestrial vegetation and its associated wildlife use.

4.68 BENTHOS

4.69 Present Conditions.

4.70 Alternatives #1 thru #3. The following is a summary of benthos found in the study area, as detailed in the Composite EIS for Maintenance Dredging. At Mare Island Strait the most prevalent bottom dwellers are marine worms, snails and clams. In the vicinity of San Pablo Bay Disposal Site (SF 10), samplings in the past have revealed softshell clams, mud mussels, gem clams, Japanese littenecks, and various worms. Commercially important species also found in San Pablo Bay include Bay shrimp, Dungeness crab and some native oysters. San Pablo Bay is an important nursery for the commercial Dungeness crab.

4.71 The Carquinez Strait Disposal Site (SF 9) has a diversity of bottom invertebrates, primarily worms and some clams.

4.72 Impacts.

4.73 Alternative #1. No change.

4.74 Alternatives #2-A, #2-B and #2-C. All three dredge types cause physical disturbance of the benthic habitat at both the dredge and the aquatic disposal sites. The surface sediments, where most of the benthic community resides, are removed by excavation at the dredge site and covered by dumping at the aquatic disposal site. Dredging operations would kill some organisms and trap others which are then transported to the disposal site. Disposal operations relocate those organisms and possibly smother some which become trapped under the mounding disposal material. Clamshell dredging (Alternative #2-A) and hopper dredging (Alternative #2-B) are less violent than hydraulic dredging (Alternative #2-C) in this transporting process. Repopulation at the dredge and disposal sites is expected after completion of dredging operations. Depending on the habitat type at the sites, repopulation can take weeks, months, or possibly years. Mare Island Strait has been dredged semi-annually since 1931 so the area has been repeatedly disturbed. Carquinez Strait (SF 9) and San Pablo Bay (SF 10) disposal sites have been used for disposal of dredged material from Mare Island Strait and Pinole Shoal Channel, respectively. For the last 10 or more years, various agencies such as Department of Fish and Game, Fish and Wildlife Service and U.S. Geological Survey have performed periodic benthic sampling in the general area of San Pablo Bay and Carquinez Strait. To date no analysis of the collected data has indicated significant adverse impacts on benthos due to dredging and disposal operations.

4.75 Alternative #3. Dredging operations would temporarily destroy the benthic habitat by removing surface sediments which contain most of the benthic community in an area. Land disposal would kill the transported organisms. Repopulation at the dredge sites is expected after completion of dredging operations. Mare Island Strait has been dredged semiannually since 1931 and the area has been repeatedly disturbed. No significant negative impacts on benthos have been identified to date from data collected in the area by other State and Federal agencies.

4.76 FISH

4.77 Present Conditions. There are 63 known species of fish that reside in San Pablo Bay, as shown in Appendix D-Table 1. Twenty species, primarily sharks, rays, and surfperch, utilize the area as a spawning ground. Eight species are transient, passing through the area to spawn in the Sacramento and San Joaquin Rivers. Five are freshwater species which only enter in times of high fresh water runoff. (Navy, 1974)

4.78 Bottom fish which feed on the local benthic population include gobies, sculpins, flounder, sole, sharks and rays. The three flounders are a popular sportfish found in the area. Free-swimming fish which can be found in the area include anchovy, smelt, and surfperch.

4.79 Mare Island Strait is the main connecting link between San Pablo/Suisun Bay and the Napa River. Although there is additional access via sloughs in the area such as Napa, China and South Sloughs, use of these sloughs by fish is not known and it is assumed most anadromous fish migrate through Mare Island Strait. Therefore, Mare Island Strait is a critical link in the migratory path of certain anadromous fish which spawn in the Napa River; the anadromous fishery includes steelhead trout, striped bass, and white sturgeon.

4.80 Steelhead are in the area during the months of November through January and April through June, with some use in other months too. Adult sturgeon, which have been seen as far upstream as the City of Napa, are likely to be in the area from February through July, perhaps longer. Striped bass generally migrate through the area in late winter and spring and again in summer; some have been sighted upstream at the City of Napa. (Navy, 1974).

4.81 Impacts.

4.82 Alternative #1. Mare Island Strait and Carquinez Strait would continue to be a migratory path for certain anadromous fish. The no project alternative would not have significant direct impacts on these fish or other species which are found in the area.

4.83 Alternatives #2-A, #2-B, and #2-C. All three dredge types increase turbidity in the local area of activity, creating short-term impacts on fish respiratory structures and feeding processes, and causing the fish to temporarily move from an area. There is no evidence however that turbidity levels actually block anadromous fish spawning runs. An important consideration in timing dredging operations is to avoid sensitive periods when anadromous fish larval and juvenile stages are present; these stages are considered to be particularly susceptible to the stress of dredging and disposal operations. This is usually managed by avoiding work during major migratory cycles (i.e. April to June and November to January). The aquatic disposal that accompanies these three types of dredging alternatives loads suspended solids into the water column in the disposal area and can cover such species as the starry flounder. The flounder is attracted to the area in order to feed on those benthic organisms suspended in the water with the disposal mateial.

4.84 For at least the last decade, various agencies such as the Department of Fish and Game, Fish and Wildlife Service and U.S. Geological Survey have performed sampling of fish populations in the general area of Carquinez Strait and San Pablo Bay. During this time the Corps has performed semi-annual maintenance dredging at Mare Island Strait and biennial maintenance dredging at Pinole Shoal with disposal at Carquinez Strait (SF 9) and San Pablo Bay (SF 10) disposal sites, respectively. To date no analysis of the collected data has indicated significant adverse impacts on fish due to dredging and disposal activities.

4.85 Alternative #3. Impacts due to dredging activities would be the same as for Alternatives #2-A, #2-B and #2-C. No significant impact on fish is expected with land disposal of dredged material from Mare Island Strait. However, aquatic disposal of dredged material from Pinole Shoal would have slight impacts on local fish populations. Dredging would be timed to avoid significant migration cycles of anadromous fish (November to January and April to June).

4.86 WILDLIFE

4.87 Present Conditions.

4.88 Alternatives #1 thru #3. The residential and agricultural areas of Mare Island and Island No. 1 - Cullinan Ranch, offer habitat for animals typical of disturbed areas. Appendix D-Table 2 lists the types of wildlife either seen or expected within the project area. Mammals which are generally found in disturbed, agricultural areas include mice, rabbits, skunks and shrew. The smaller rodents probably comprise the majority of the mammal population. Larger mammals such as raccoon and muskrat would probably be found near the tidal marshes within the study area. Reptiles and amphibians are not expected to comprise much of the wildlife population in the study area. Those which are probably found in the area are listed in Table 2 of Appendix D.

4.89 The hayfields and the marshes adjacent to Dutchman Slough, South Slough and San Pablo Bay support numerous bird species especially in winter when rainwater ponds in the low areas. White-tailed kites, owls, marsh hawks, and red-tailed hawks have been sighted hunting in nearby marshes. These raptors, who may nest in nearby trees, use the surrounding region on a residential or seasonal basis. Other birds such as red-winged blackbird, house sparrow and meadowlark use the marshes and hayfields for roosting, nesting and feeding.

4.90 The marshes near Mare Island Strait, Napa River and San Pablo Bay are known habitats for the endangered California Clapper Rail (Rallus longirostris) and the Salt Marsh Harvest Mouse (Reithrodontomys raviventris). The black rail (Laterallus jamaicensis) has been sighted upstream along Napa River. No rare or endangered species are known or expected to exist in Pinole Shoal, Mare Island Strait or the Island No. 1 - Cullinan Ranch land disposal site.

4.91 Impacts.

4.92 Alternatives #1, #2-A, #2-B, and #2-C. No significant impacts on wildlife are anticipated.

4.93 Alternative #3. Up to approximately 1,350 acres of former tidal marsh, historically diked and used for agriculture, could be covered by disposal material. Wildlife that inhabit the area, or that feed in the area, would be destroyed or displaced by disposal activities. Surrounding areas would experience increased competition for food and shelter. No impacts on listed endangered or threatened species or on areas considered as critical habitat for such species are anticipated.

4.94 Once disposal of dredged material ceases it is expected there would be some sponstaneous revegetation at the site. Some wildlife use, typical of disturbed areas, would return. If the area is developed (it is currently planned for residential), further adverse impacts would be experienced by local wildlife, both on the site and at adjacent areas. On the other hand open space habitat enhancement of the site would benefit wildlife.

4.95 Mitigation. No mitigation has been proposed for use of Island No. 1 - Cullinan Ranch property as a disposal site, although in the past, the Fish and Wildlife Service and the Department of Fish and Game have requested mitigation for use of former marshland. Marsh restoration included as a mitigative measure would make Alternative #3 a realistic alternative. Upon completion of each disposal cycle, grading of the site would be necessary. Once disposal activities are finished upon reaching full site capacity, marsh restoration would include grading of the material, seeding with wetland vegetation and restoration of tidal flow by breaching levees. Restored marsh would increase the amount of habitat available for marsh dependent wildlife (including possibly salt marsh harvest mouse and clapper rail) and could compensate for the displacement of wildlife due to land disposal operations. The Island No. 1 - Cullinan Ranch disposal site is adjacent to the proposed San Pablo Bay Wildlife Refuge, and marsh restoration would increase the acreage of marsh buffer around the area.

4.96 NAVIGATION

4.97 Present Conditions.

4.98 Alternatives #1 thru #3. Navigable channels through Pinole Shoal and Mare Island Strait are currently maintained to -35 feet MLLW and -32 feet MLLW, respectively. The Mare Island Naval Shipyard has been assigned the mission to overhaul and repair a new naval ship design -- SSN 688 Class submarine. This new class of Naval ship requires -36 feet MLLW for safe navigation. The current channel depths at Pinole Shoal and Mare Island Strait would limit passage of this vessel class to high tides only.

4.99 Impacts.

4.100 Alternative #1. Navigation of this new class of ship under the no project alternative would be considered unsafe. Since several movements are required during a ship's stay at the shipyard (i.e. arrival, berth shifts, trials, and departure) the accumulative effect of waiting for the right tide could unnecessarily require ships to be off the line for a number of days. In the unlikely extreme case, channel limitations could prevent timely departure of this ship class in case of mobilization. Also, insufficient clearance between the ship's hull and the channel bottom would cause ingestion of foreign matter through the sea-water suction systems which could result in damage or failure of these systems.

4.101 Alternatives #2 and #3. The proposed project would provide the safe navigable channels required for the unrestricted movements and safe operation of this new class of ship. The dredging and dredged material disposal operation could cause some interference with navigation of ships in the work area. However, navigation in these areas would not be completely halted and any interference to navigation is expected to be insignificant.

4.102 CULTURAL RESOURCES

4.103 Present Conditions.

4.104 Alternatives # 1 thru #3. In compliance with the National Historic Preservation Act of 1966 (16 U.S.C. 470(f)) and Executive Order 11593 of 13 May 1971 the most recent listing of the National Register of Historic Places (with monthly supplements through March 1981) has been consulted. No National Register or eligible properties were found to be within the impact area of the proposed project. However, one National Historic Landmark, Mare Island Naval Shipyard, was found to be adjacent to but not within the impact area of the proposed project.

4.105 Request has been made of the State Historic Preservation Officer for any further information he may have concerning National Register or eligible properties in the vicinity of the proposed project. In addition, request has been made of the Regional Office of the California Archaeological Site Survey at both Sonoma State University and Sacramento State University for any information they may have concerning cultural resources within or adjacent to the impact area of the proposed project (Reference Appendix B, Documents B-3, B-4, and B-5). By letter dated 11 May 1981, the State Historic Preservation Officer stated that"... no properties included in or eligible for inclusion in the National Register of Historic Places should be affected by the proposed undertaking(s)." (Reference Appendix B, Document B-6). By letters dated 4 May 1981 and 30 May 1981 the Regional Office of the California Archaeological Site Survey stated the"... subject parcels should be considered to be within an area of low archaeological sensitivity and further archaeological study is not recommended at this time." (Reference Appendix B, Documents B-7 and B-8).

4.106 Impacts.

4.107 Alternative #1. No change.

4.108 Alternatives #2-A, #2-B, and #2-C. These alternatives, consisting of dredging with aquatic disposal of dredged materials, would have no effect upon any known National Register or eligible properties. It is extremely unlikely that any cultural resources are extant within either the dredge sites or the aquatic disposal sites.

4.109 The channel areas have been previously dredged and are maintained at the following depths:

Pinole Shoal Channel: 35 feet below MLLW
Mare Island Strait: 32 feet below MLLW

In addition, the bottom sediments of both channels are subject to horizontal flucuation as a result of natural and man-made currents. The aquatic disposal areas are designated disposal sites which have received dredged materials sufficient to bury any cultural resources located there. Since no dredging or dredged material disposal would occur within Mare Island Naval Shipyard, the proposed project would not impact the Shipyard.

4.110 Alternative #3. This alternative, consisting of dredging with land and aquatic disposal, would have no effect upon any known National Register or eligible properties. The upland disposal area, as shown on historic USGS maps (Nichols and Wright, 1971), consisted entirely of tidal marshlands. These marshlands have been completely filled to create the current upland. It is extremely unlikely that any prehistoric archaeological resources, with integrity and research potential sufficient to qualify for listing in the National Register of Historic Places, could be located within the present fill layers. Several historic farm structures are within the general boundaries of the potential upland disposal area. They would not be covered or demolished as a result of filling. The potential remains, however, that the farming structures may constitute a significant cultural resource which could be indirectly impacted by the proposed undertaking. Since no dredging or dredged material disposal would occur within Mare Island Naval Shipyard, the proposed project would not impact the Shipyard.

4.111 Mitigation - Alternatives #2 and #3. If any cultural resources are discovered in the course of the proposed undertaking, work shall cease pending notification of Department of the Interior and the State Historic Preservation Officer. The Corps of Engineers would fully comply with the Terms of the Archaeological and Historic Preservation Act of 1974, as specified in 36 CFR 800.7. Also, if Alternative #3 is selected than prior to placement of any dredged material on the site, the Corps would sponsor a professional evaluation of the farming structures, both individually and as a complex, as related to the criteria of the National Register of Historic Places to ensure that eligible structures are not affected by the proposed action or that appropriate mitigation measures are implemented.

4.112 POPULATION AND EMPLOYMENT

4.113 Present Conditions.

4.114 Alternatives #1 thru #3. The Vallejo-Fairfield-Napa Standard Metropolitan Statistical Area (SMSA) is comprised of Solano and Napa counties. The counties bordering Solano County are: Napa to northwest, Yolo to the northeast, Sacramento to the east, and Contra Costa to the south.

4.115 Between 1970 and 1979 the population of Solano County increased approximately 27 percent (172,000 to 218,500). Approximately 27 percent of the Bay Area military population live in Solano County (13,800) and comprise about 6 percent of the County's population. Vallejo is the largest city in the county (72,700) as well as the area's industrial and commercial center. During the 1970-1979 time period the population of Vallejo increased only 1.4 percent.

4.116 The largest employment category for Solano County is government. Within the county, government employs approximately 50 percent of all nonagricultural workers. Mare Island Naval Shipyard is the single largest employer of government civilian workers in the county -- approximately 10,000 civilians plus an additional 4,900 in military personnel. For the fiscal year 1980, Mare Island Naval Shipyard through payroll, public works contracts, and material purchases accounted for 328 million dollars of expenditures.

4.117 Impacts.

4.118 Alternative #1. The no project alternative could result in significant adverse impacts. The Mare Island Naval Shipyard's workload would decrease as those vessel classes now assignable to the Shipyard become obsolete. The reduced workload could result in a major reduction-in-force of employees if the Shipyard were to remain open on a limited work basis or the Shipyard could ultimately be closed.

4.119 Alternatives #2 and #3. The proposed project would not result in any significant increase in the area or Shipyard population and employment. The proposed project would allow for the continuance of the existing condition.

4.200 ECONOMIC COMPARISON OF ALTERNATIVE DREDGING AND DISPOSAL SYSTEMS

4.201 Present Conditions.

4.202 Alternatives #1 thru #3. The comparative economics of alternative dredging and disposal systems were analyzed in the Final Composite Environmental Statement Maintenance Dredging San Francisco Bay and Appendix J-Land Disposal of the Dredge Disposal Study San Francisco Bay and Estuary. The results of the computer based cost comparison indicated that for short hauls to aquatic disposal sites the hopper dredge was determined to be the least expensive transport mode. Large clamshell dredges (18 and 13 cubic yard capacity) appeared to be least costly when a hopper dredge was not feasible (e.g. limited depths or manuevering areas). Hydraulic dredge costs approached those of the hopper or clamshell dredges at dredge disposal sites involving short temporary pipelines. One reason for the greater costs associated with hydraulic dredges was the high capital cost of temporary pipelines of more than a minimum length extending from the dredges, since the pipeline cost could only be allocated over the volume of material dredged for one specific project. Relative costs of land disposal for dredged material were on the order of twice the costs associated with aquatic disposal of dredged material.

4.203 Impacts.

4.204 Alternative #1. No change.

4.205 Alternatives #2 and #3. Based on alternative #2-B (hopper dredging) having a relative base cost of one, preliminary estimates comparing the alternative dredging and disposal systems to Alternative #2-B are shown below:

Alternative	Relative Cost
#2-A (Clamshell)	2.5
#2-B (Hopper)	1.0
#2-C (Hydraulic with aquatic disposal)	2.0
#3 (Hydraulic with land disposal, excluding land acquisition costs)	3.0

4.206 As shown in the comparison Alternative #2-B is estimated to be the least costly.

5.00 UNAVOIDABLE ADVERSE IMPACTS

IMPACTS*	ALTERNATIVES #1	#2-A	#2-B	#2-C	#3
Increased sediment suspension in the water column		X	X	X	X[1/]
Temporary reduction in the concentration of dissolved oxygen		X	X	X	X[1/]
Potential resuspension of contaminants with levels below established water quality objectives		X	X	X	X[1/]
Increased turbidy and resultant stress on planktonic larvae, filter feeding organism, and reduction in photosynthesis		X	X	X	X[1/]
Dredging operation will destroy and transport benthic organisms		X	X	X	X
Disposal operation will cover benthic and epibenthic organisms		X	X	X	X[1/]
Creation of fluid mud layer and resultant increase in areal coverage of benthos		X	X	X	X[1/]
Increased turbidity may confuse migrating anadromous fish		X	X	X	X[1/]
Potential for destruction of fish from disposal operation		X	X		
Covering of terrestrial vegetation					X

* "X" Denotes an impact for that alternative.

1/ Impact does not apply to the land disposal portion of alternative.

6.00 THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

IMPACTS*	ALTERNATIVES #1	#2-A	#2-B	#2-C	#3
Provision of safe navigable channels		X	X	X	X
Allow for support of national defense posture		X	X	X	X
Provide continued employment levels at shipyard		X	X	X	X
Alteration of aquatic and terrestrial environment at dredge and disposal sites		X	X	X	X

* "X" Denotes an impact for that alternative.

7.00 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED*

COMMITMENT OF RESOURCES	ALTERNATIVES				
	#1	#2-A	#2-B	#2-C	#3
Loss of marine life		X	X	X	X
Use of materials and energy during project construction and maintenance		X	X	X	X
Consumption of energy, water, and services during project operation		X	X	X	X
Degradation of water quality during project construction and maintenance		X	X	X	X

* "X" Denotes an impact for that alternative.

8.00 COORDINATION

8.01 Public Participation. The application for a Department of the Army permit by the U.S. Navy was first announced by the Corps in Public Notice No. 12859-24 on 11 October 1979. In accordance with Department of the Army regulations, comments were solicited on the Public Notice from the general public and specific Federal and State agencies. A Notice of Intent to prepare a Draft EIS was published in the Federal Register 13 March 1980. On 14 July 1980 a public scoping meeting on the proposed Navy deepening of Pinole Shoal and Mare Island Strait was conducted at the Vallejo City Library. The Draft EIS was released to the public on 30 April 1981.

8.02 Government Agencies. Comments on the Public Notice were received from the U.S. Department of Commerce - National Marine Fisheries Service, U.S. Department of the Interior, the U.S. Coast Guard, the U.S. Environmental Protection Agency and the Resources Agency of California. The following is a summary of the comments received. The U.S. Department of Commerce - National Marine Fisheries Service and the U.S. Environmental Protection Agency withheld their comments until review of the "Environmental Statement" and "Final EIS", respectively. The U.S. Coast Guard requested their special conditions 3 (disposal of dredged material within Carquinez Strait (SF 9) established boundaries and notification of the Coast Guard Vessel Traffic Service five minutes in advance of departure) and 5 (cite disposal site in body of permit and send copy to Coast Guard) be included in any Corps permit. The U.S. Department of Interior Fish and Wildlife Service (U.S. F&WS) opposed additional aquatic disposal of dredged material due to adverse environmental impacts (destruction of benthic and epibenthic organisms, degradation of water quality via resuspension and redistribution of sediments and pollutants which particularly affect anadromous fish species). The U.S. F&WS recommended consideration of an upland dredged material disposal site with the dredged material used for development of wetlands on diked-off former tidelands. They also recommended that dredging operations not occur from February through July, the major anadromous fish spawning/migration season. The Resources Agency of California - Department of Fish and Game (Cal. F&G) recommended the permit be held in abeyance until a baseline investigation is conducted in order to determine the period of least biological impact since they are concerned about the timing and method of sediment relocation as related to effects on fishes and benthic and epibenthic organisms. Cal. F&G indicated the baseline investigation should include sampling by otter trawl and ring net to document the distribution and abundance of such fishes as starry flounder, stripped bass, sturgeon as well as bay shrimp and market crab epibenthic species.

8.03 Comments on the Public Notice were also received from the following agencies, citizen groups, and individuals:

a. The Council of Bay Area Resource Conservation Districts stated the dredging would cause no adverse impact to their resource base.

b. Save San Francisco Bay Association requested the permit be held in abeyance until completion and review of the EIS.

c. State of California State Lands Commission, California Waterfowl Assocation, and Supervisor Nancy C. Fahdan requested copies of the Environmental Statement.

d. Bendix Research recommended that mercury content should be analyzed as a pollutant. Also, possible impacts on loss of shipping revenue to existing port facilities, effects on total shipping volume, shipment of hazardous materials and collision risks in San Francisco Bay should be evaluated.

e. Shellmaker, Inc. suggested the last sentence of paragraph 2 of the Public Notice should read "The dredging would be accomplished by contract with private industry using hopper, clamshell, or hydraulic dredges."

8.04 No written statements were submitted at the Public Scoping Meeting held at the Vallejo City Library. However, oral statements were made by four individuals. Their statements are summarized as follows:

a. Mr. Rugg representing the California Department of Fish and Game expressed concern for the biologic resources at both the dredge and dredged material disposal sites. These concerns are essentially the same as expressed in the State Resources Agency comment letter on the Public Notice (reference paragraph 6.02).

b. Ms. Pratt of the U.S. Fish and Wildlife Service, 1) agreed with Mr. Rugg's statement, 2) expressed concern about toxic materials in the water column and 3) recommended upland disposal of dredged material.

c. Mr. Riley, representing Congressman Fazio stated they were interested in the project and environmental process.

d. Ms. Allen of the Mare Island Navy Yard Association indicated her group supported the project.

8.05 Draft Environmental Impact Statement - Comments and Responses. The Draft EIS was mailed to those agencies and individuals listed in paragraph 8.06. Those agencies and individuals marked by an asterisk, commented on the Draft EIS. In general, the comments focused on the following major issues:

a. Disposal of Dredged Material: Aquatic vs Land Disposal - The fish and wildlife resource agencies recommended that dredged material from Mare Island Strait be deposited on land (i.e. Alternative #3 - Island No. 1) in order to minimize the adverse impacts on aquatic resources (eg. destruction of benthic and epibenthic organisms, interference with anadromous fish species, water qualilty degradation). In conjunction with land disposal of dredged material on Island No. 1 the fish and wildlife resource agencies also recommended marsh restoration/creation of the site in conjunction with long-term dredged material disposal (i.e. enhancement) as well as mitigation for land disposal. Of the three alternative methods of dredging with aquatic disposal considered in the EIS (i.e. clamshell/barge, hopper, and hydraulic cutterhead with pipeline disposal) the fish and wildlife agencies were unanimous in recommending against hydraulic cutterhead with aquatic pipeline disposal dredging.

Marsh restoration/creation of Island No. 1 would require land acquisition by the Navy. The Navy's authorization for the proposed project did not include authority for land acquisition. The process of seeking Congressional authority for land acquisition takes about three years. Given the length of time required for land acquisition authority versus the planned spring 1982 arrival at Mare Island of the Navy's new class of vessel, marsh restoration/creation does not appear to be viable. In addition, land disposal with marsh restoration/creation does not provide a solution to the long-term maintenance dredging requirement given the finite capacity of a land disposal site.

b. Baseline Investigation - The California Department of Fish and Game recommended a baseline investigation be conducted prior to dredging in order to better define the period of least biological impact as related to timing of dredging/disposal activities and mode of sediment relocation affecting fish, benthic and epibenthic organisms.

The need for new baseline investigations is questionable given the studies conducted under the Dredge Disposal Study San Francisco Bay and Estuary, the Final Composite Environmental Statement Maintenance Dredging Existing Navigation Projects San Francisco Bay Region, and the Dredged Material Research Program of the Army Engineer Waterways Experiment Station as well as the sampling data which has been and is currently being collected in the Bay by various state and federal agencies. The Department of Fish and Game, National Marine Fisheries Service and the Fish and Wildlife Service have made recommendations as to acceptable periods for dredging (i.e. Fish & Game: September to December; NMFS: February to March and July to October; and F&WS: August to January). The Navy will consider changes in these recommended time periods for dredging operations addressed in this EIS.

c. Salinity Intrusion - Both the U.S. Environmental Protection Agency and the California State Department of Water Resources have indicated concern for saltwater intrusion into Suisun Bay and Delta. The Environmental Protection Agency stated a monitoring program is needed. The Department of Water Resources recommended the Navy sponsor salinity intrusion studies on the Corps' Bay-Delta Model or approximate the salinity intrusion effect by extrapolation of test data collected for the John F. Baldwin Ship Channel Study.

Based on the daily and seasonal large scale variations in salinity levels, existing depths of greater than 36 feet below MLLW throughout the center half of Pinole Shoal Channel, the proposed marginal channel improvements of dredging within only the left and right channel quadrants, and Corps experience with monitoring stations from San Pablo Bay to Chipps Island, a field monitoring program would not detect increases in saltwater intrusion into the Suisun Bay/Delta system. Also, a testing program using the San Francisco Bay - Delta hydraulic model would not be able to test for the desired information concerning salinity intrusion because of known large variations which occur in both the model and protdotype. The level of any salinity increase associated with the proposed small change in channel depth when compared to these large variations probably could not be detected. Also, approximating the effect of the Navy's deepening Pinole Shoal by one foot on salinity intrusion based on tests conducted for the John F. Baldwin Ship Channel Study should not be conducted. The effect is not necessarily a linear function since the method of salinity intrusion is unknown.

Complete copies of the comment letters and responses are in Appendix E.

8.06 Comments Requested. Copies of the Draft Environmental Impact Statement were furnished to the following:

a. U.S. Senators

Alan Cranston
S. I. Hayakawa

b. U.S. Representatives

George Miller
Vic Fazio

c. State Senators

John A. Nejedly
Jim Nielsen

d. Federal Agencies

* Advisory Council on Historic Preservation
Department of Agriculture
Western Technical Services Center
* Soil Conservation Service
* Forest Service

* Department of Commerce
Secretary for Environmental Affairs
National Marine Fisheries Service
National Oceanic & Atmospheric Adminstration

Department of Energy
Department of Health, Eduction & Welfare
Department of Housing & Urban Development

* Department of the Interior
Heritage Conservation & Recreation Service
Office of Environmental Project Review
Fish & Wildlife Service
Geological Survey

Department of Transportation
12th Coast Guard District
* Federal Highway Administration

* Environmental Protection Agency
* Federal Energy Regulatory Commission
Federal Maritime Commission

* Commented on the Draft EIS

e. State Agencies

Business Transportation Agency of California
Division of Highways
CALTRANS

Health & Welfare Agency of California
Bureau of Sanitary Engineering
Vector & Waster Management Section
Environmental Health Services Program
Nature American Heritage Commission

* Office of Planning & Research
* The Resources Agency of California
Secretary for Resources
* Department of Health
* Department of Water Resources
* Department of Conservation
* Department of Boating & Waterways Division
* Department of Fish & Game
* Department of Parks & Recreation
* Department of Transportation
* Regional Water Quality Control Board
* San Francisco Bay Conservation & Development Commission
* State Historical Preservation Officer
* State Lands Commission
* State Water Resources Control Board

f. Regional Agencies

Association of Bay Area Governments
Bay Area Air Pollution Control District
Metropolitan Transportation Commission

g. County Agencies

Contra Costa Mosquito Abatement District
* Contra Costa Resource Conservation District
* Solano County Mosquito Abatement District

h. Libraries

Vallejo City Library

i. Educational Institutions

College of Marin - Biology Department
Colorado State University - Morgan Library
Environmental Design Librarian - University of California Berkeley
Water Resources Center Archives - University of California Berkeley

* Commented on the Draft EIS

j. Chamber of Commerce

California Chamber of Commerce

k. Organization of Service Groups

League of California Cities

l. Conservation Groups

California Institute of Man in Nature
California Tomorrow
California Waterfowl Association
California Wildlife Federation
Council of Bay Area Resource Conservation Districts
San Francisco Ecology Center
Environmental Defense Fund
ENVIRPYEST
Friends of the Earth
Institute for the Human Environment
Izaak Walton League of America, Inc.
Marin Conservation League
National Parks & Conservation Association
Natural Resource Defense Council
The Nature Conservency
Northcoast Environmental Center
Northern California Committee for Environmental Information
Oceanic Society
Planning & Conservation League
Save San Francisco Bay Association
San Francisco Bay Planning & Urban Renewal Association
SCOPE
Society for California Archeology
West Contra Costa Conservation League
West County Ecology Center

Sierra Club
San Francisco Bay Chapter

Associated Sportsmen of California
California Trout
Trout Unlimited
California Marine Affairs & Navigation Conference

m. Others

Mr. William H. Barbous
Ms. Selina Bendix, Ph. D.
Mr. William P. Boland, Jr.
* Mr. Tom Corneto
Mr. Luman C. Drake
Supervisor Nancy C. Fahdan
Mr. Harry Silcocks
Mr. William E. Siri
Mr. James C. Tanous
Mr. William A. Barbour
Mr. Walden Williams

* Commented on the Draft EIS

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LIST OF PREPARERS

The following people were primarily responsible for preparing this Environmental Impact Statement.

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Margaret Foster	Environmental Planning	8 years, Environmental Branch, S.F. District Corps of Engineers	Environmental Protection Specialist
Barney Opton	Environmental Planning	7 years, Environmental Branch, S.F. District Corps of Engineers	Acting Chief, Management and Services Section, Environmental Br.
Mark Rudo	Archaeology	2 years, Environmental Branch, S.F. District	Archaeologist
John Sustar	Navigation Planning and Engineering	10 Years, Coastal Engineering, S.F. District Corps of Engineers	Chief, Hydraulics and Coastal Section
Jody Zaitlin	Biology	2 years, Environmental Branch, S.F. District Corps of Engineers	Environmental Protection Specialist

PLATES

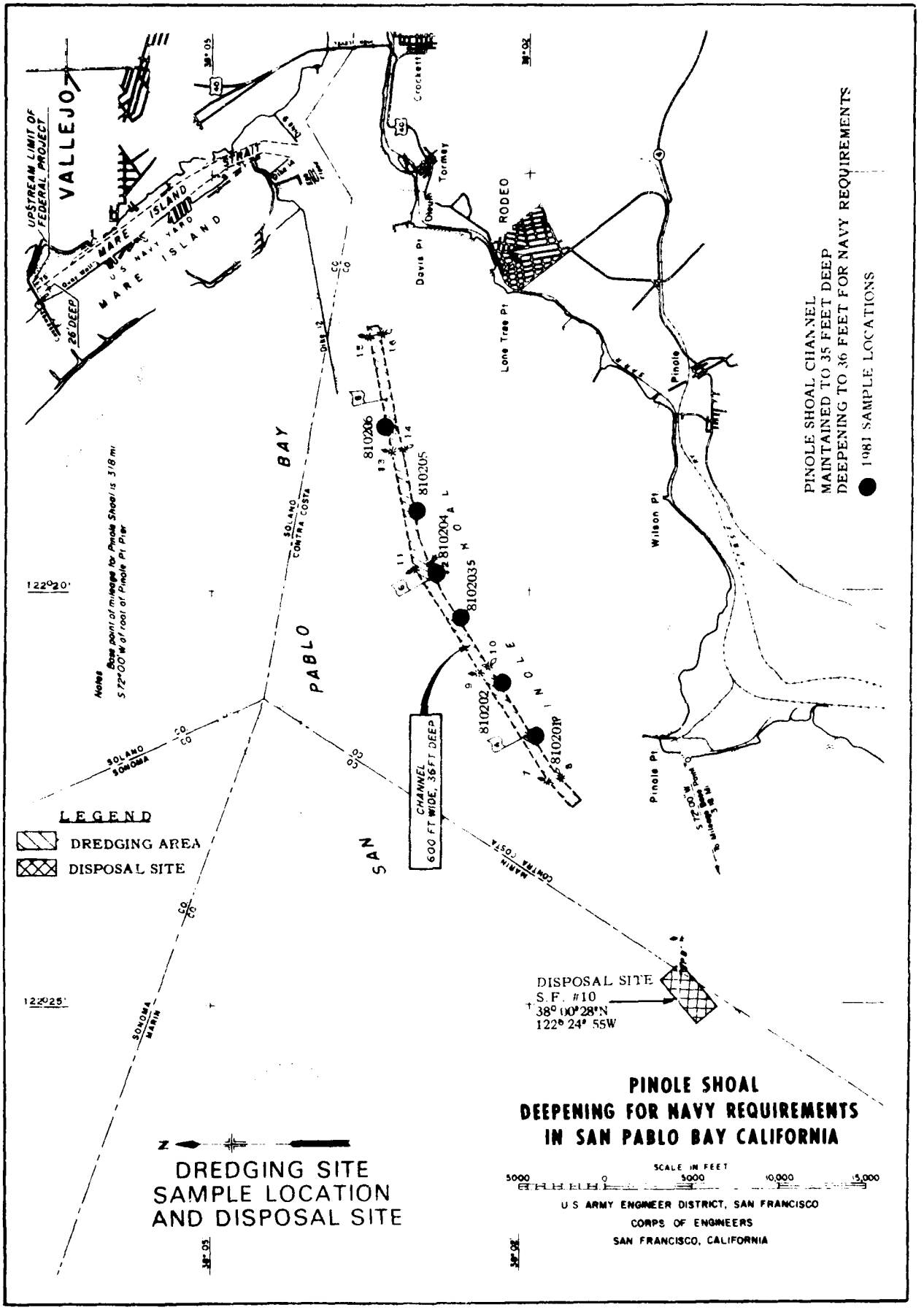
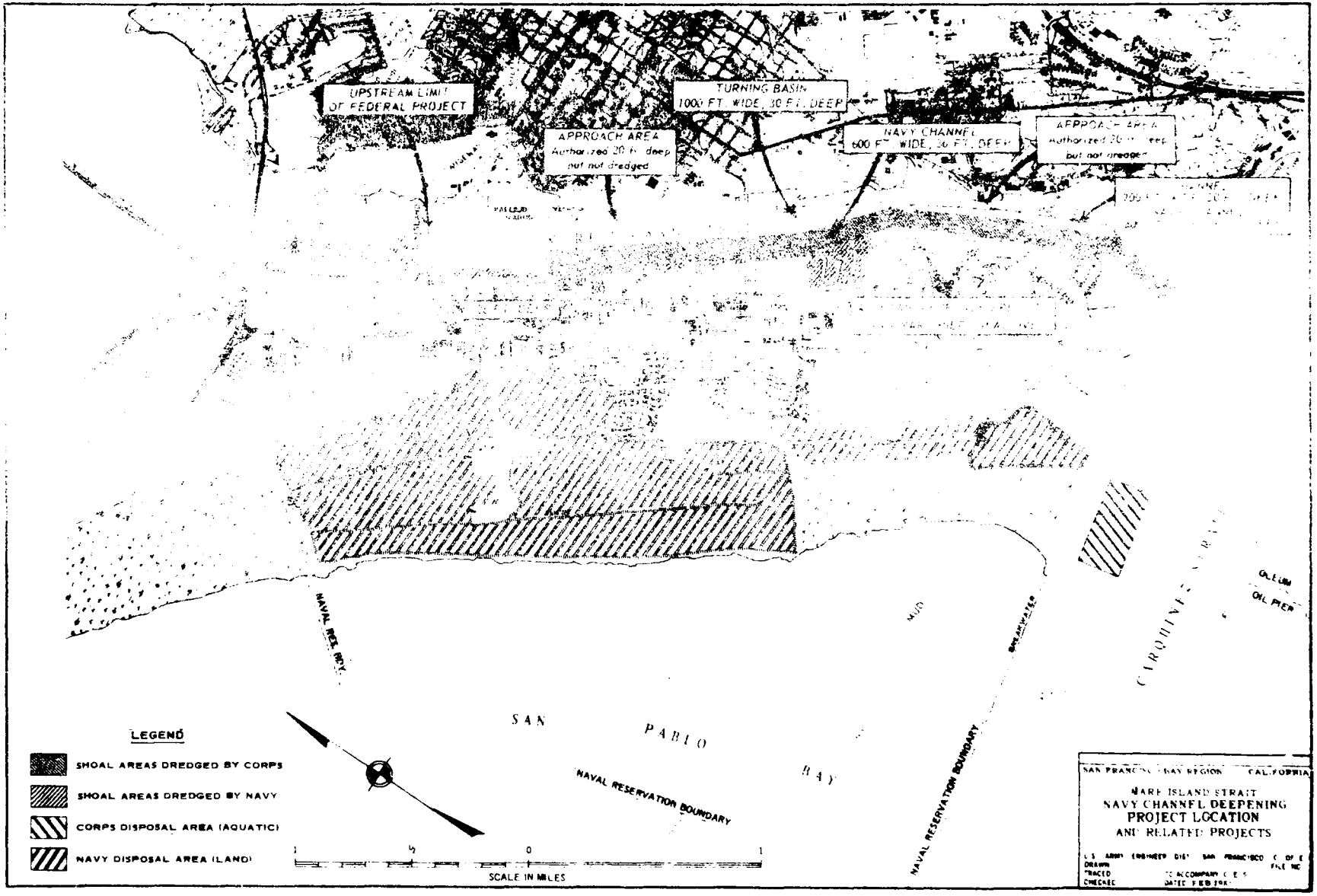

VALLEJO
UPSTREAM LIMIT OF FEDERAL PROJECT
MARE ISLAND
MARE ISLAND STRAIT
U S NAVY YARD
MARE ISLAND
26' DEEP
RODEO
Crockett
Tormey
Davis Pt
Lone Tree Pt
Pinole
Wilson Pt
Pinole Pt
SAN PABLO BAY
SOLANO
CONTRA COSTA
SOLANO
SONOMA
CONTRA COSTA
MARIN
SONOMA
MARIN
122°20'
122°25'
38°05'
38°02'
Notes
Base point of mixage for Pinole Shoal is 3/8 mi S 72°00' W of roof of Pinole Pt Pier
810206
810205
810204
810203
810202
810201
CHANNEL
600 FT WIDE, 36 FT DEEP
PINOLE SHOAL CHANNEL
MAINTAINED TO 35 FEET DEEP
DEEPENING TO 36 FEET FOR NAVY REQUIREMENTS
1981 SAMPLE LOCATIONS
LEGEND
DREDGING AREA
DISPOSAL SITE
DISPOSAL SITE
S.F. #10
38° 00' 28"N
122° 24' 55W
DREDGING SITE
SAMPLE LOCATION
AND DISPOSAL SITE
PINOLE SHOAL
DEEPENING FOR NAVY REQUIREMENTS
IN SAN PABLO BAY CALIFORNIA
SCALE IN FEET
5000 0 5000 10,000 15,000
U S ARMY ENGINEER DISTRICT, SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA

PLATE 1


UPSTREAM LIMIT OF FEDERAL PROJECT
APPROACH AREA
Authorized 20 ft. deep but not dredged
TURNING BASIN
1000 FT. WIDE, 30 FT. DEEP
NAVY CHANNEL
600 FT. WIDE, 30 FT. DEEP
APPROACH AREA
Authorized 30 ft. deep but not dredged
NAVAL RES. RET.
SAN PABLO BAY
NAVAL RESERVATION BOUNDARY
NAVAL RESERVATION BOUNDARY
MUD
BREAKWATER
OIL PIER
CHEVRON
LEGEND
SHOAL AREAS DREDGED BY CORPS
SHOAL AREAS DREDGED BY NAVY
CORPS DISPOSAL AREA (AQUATIC)
NAVY DISPOSAL AREA (LAND)
1 ½ 0 1
SCALE IN MILES
SAN FRANCISCO BAY REGION CALIFORNIA
MARE ISLAND STRAIT
NAVY CHANNEL DEEPENING
PROJECT LOCATION
AND RELATED PROJECTS
U.S. ARMY ENGINEER DIST. SAN FRANCISCO C. OF E.
DRAWN FILE NO.
TRACED
CHECKED DATE FEB 70

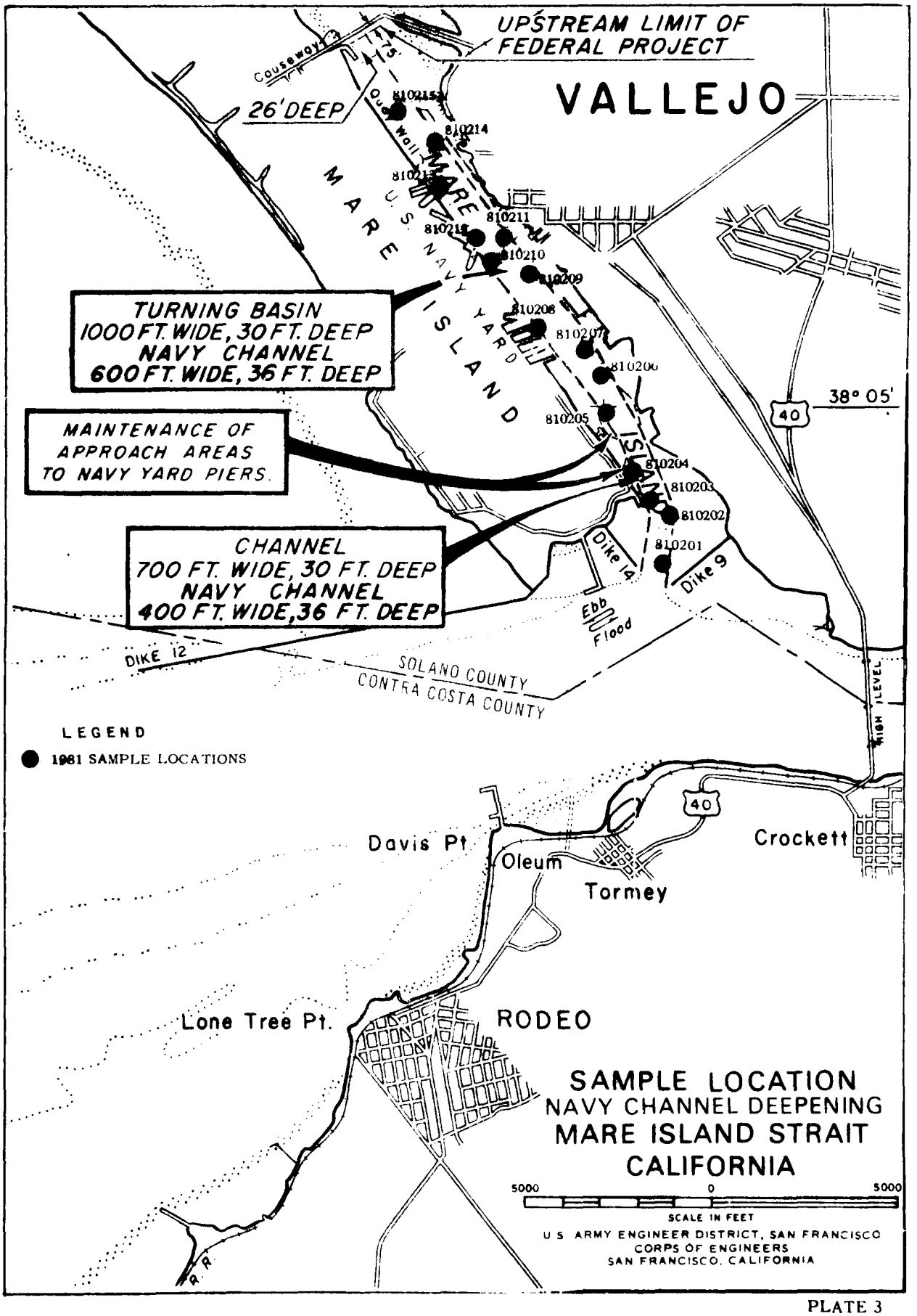
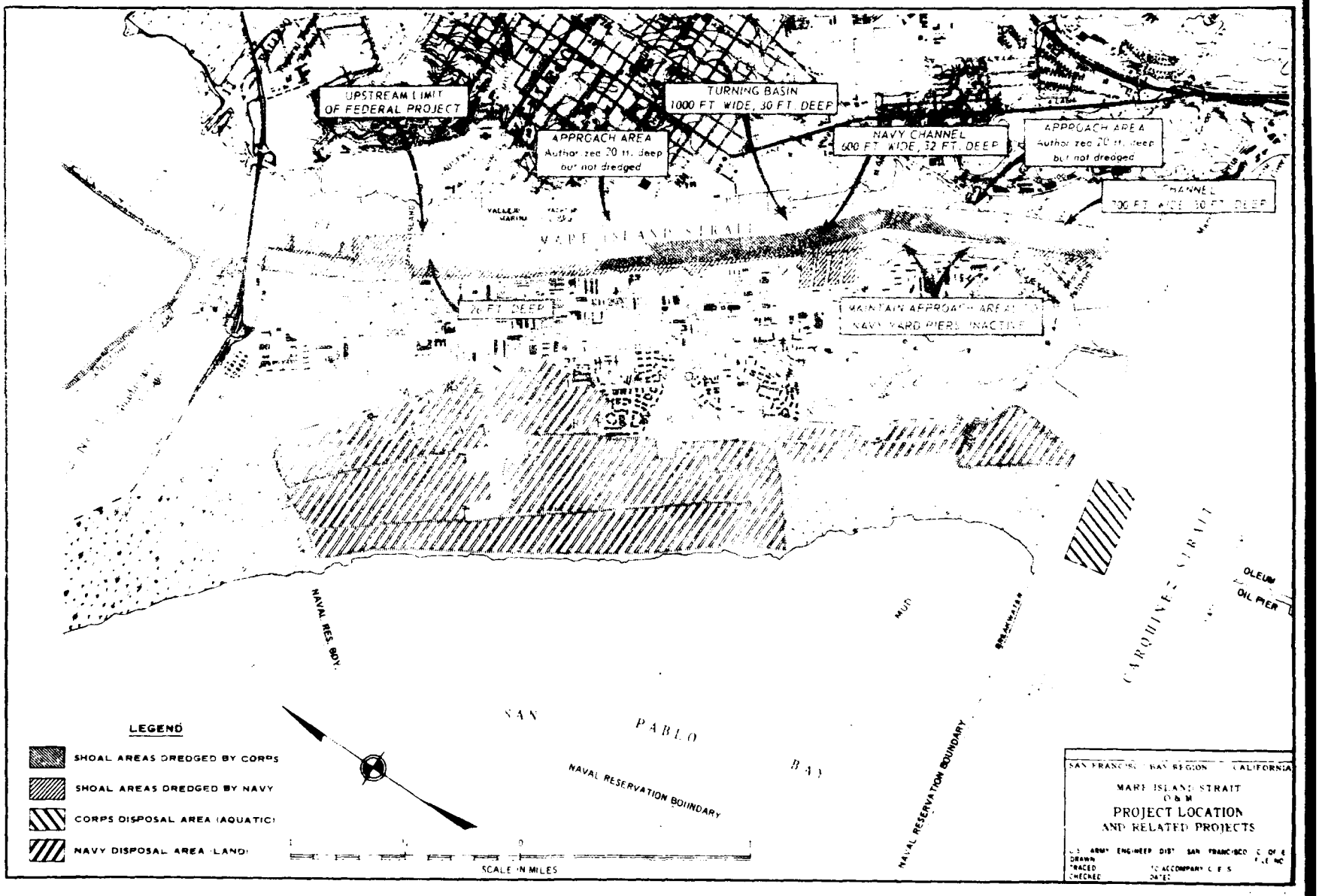

UPSTREAM LIMIT OF FEDERAL PROJECT
VALLEJO
26' DEEP
Quay Wall
MARE ISLAND
U.S. NAVY YARD
TURNING BASIN
1000 FT. WIDE, 30 FT. DEEP
NAVY CHANNEL
600 FT. WIDE, 36 FT. DEEP
MAINTENANCE OF APPROACH AREAS TO NAVY YARD PIERS.
CHANNEL
700 FT. WIDE, 30 FT. DEEP
NAVY CHANNEL
400 FT. WIDE, 36 FT. DEEP
810215
810214
810213
810212
810211
810210
810209
810208
810207
810206
810205
810204
810203
810202
810201
ISLAND
Dike 14
Dike 9
Ebb
Flood
DIKE 12
SOLANO COUNTY
CONTRA COSTA COUNTY
38° 05'
40
HIGH LEVEL
LEGEND
1981 SAMPLE LOCATIONS
Davis Pt
Oleum
Tormey
Crockett
Lone Tree Pt.
RODEO
SAMPLE LOCATION
NAVY CHANNEL DEEPENING
MARE ISLAND STRAIT
CALIFORNIA
5000
0
5000
SCALE IN FEET
U S ARMY ENGINEER DISTRICT, SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA

PLATE 3


UPSTREAM LIMIT OF FEDERAL PROJECT
APPROACH AREA Author zed 20 ft. deep but not dredged
TURNING BASIN 1000 FT. WIDE, 30 FT. DEEP
NAVY CHANNEL 600 FT. WIDE, 32 FT. DEEP
APPROACH AREA Author zed 20 ft. deep but not dredged
CHANNEL 700 FT. WIDE 30 FT. DEEP
MARE ISLAND STRAIT
26 FT. DEEP
MAINTAIN APPROACH AREA
NAVY YARD PIERS INACTIVE
NAVAL RES. BOY.
MUD
BREAKWATER
CAROUINES CRKT
OLEUM
OIL PIER
SAN PABLO BAY
NAVAL RESERVATION BOUNDARY
NAVAL RESERVATION BOUNDARY
LEGEND
SHOAL AREAS DREDGED BY CORPS
SHOAL AREAS DREDGED BY NAVY
CORPS DISPOSAL AREA (AQUATIC)
NAVY DISPOSAL AREA (LAND)
SCALE IN MILES
SAN FRANCISCO BAY REGION CALIFORNIA
MARE ISLAND STRAIT
O & M
PROJECT LOCATION
AND RELATED PROJECTS
U.S. ARMY ENGINEER DIST. SAN FRANCISCO C. OF E.
DRAWN
TRACED
CHECKED
TO ACCOMPANY C. E. S.
DATE
FILE NO.


NAPA
RIVER
HIGHWAY 37
PABLO
BAY
SCALE 0 2,000 4,000 6,000 8,000 FEET

Plate 3

APPENDIX A

FUNDAMENTALS OF DREDGING

There are basically two methods of dredging: mechanical and hydraulic. There are several types of dredging equipment for each method of dredging. Mechanical plants consist of bucket, dipper, dragline, and clamshell (or grapple) dredges. Hydraulic equipment consists of the plain suction pipeline, cutterhead pipeline, side casting hopper and self-propelled hopper dredges. The various types of dredges are briefly described and illustrated on the following pages.

APPENDIX A

FUNDAMENTALS OF DREDGING

INTRODUCTION

> The viability of the economy of the United States is clearly dependent upon our ability to keep the channels of our waterways, ports and harbors open to navigation (1)

To accomplish the above objective requires dredging which is the process by which sediments are removed from the bottom of streams, lakes, estuaries and coastal waters; transported via ship, barge, or pipeline; and discharged to land or water. The usual purposes of dredging are to maintain, improve, or extend navigable waterways, and to provide construction materials such as sand, gravel, or shell.

The annual volume of material removed from our nation's waterways is approximately 380 million cubic yards which includes maintenance and new work projects. Present cost to the Federal government for dredging is about $160 million a year, with $115 million of this for maintenance dredging and the other $45 million for new work (1). Approximately 45 percent of the dredging done by the Corps is handled by Corps-owned dredges with the rest done under contract.

In San Francisco Bay, approximately 6.8 million cubic yards of maintenance dredging is by the Federal government and another 1.9 million by local and private concerns. Further details on dredging in the San Francisco Bay are described in the Introduction and Project Description sections of this Statement.

Dredges can be classified into two main categories: mechanical and hydraulic. There are several types of machines in each category. Mechanical plants consist of bucket, dipper, dragline and clamshell (or grapple) dredges. Hydraulic equipment consists of the plain suction pipeline, cutterhead pipeline, side casting hopper and the self-propelled hopper dredges. The various types of dredges are briefly described and are shown in Figures A-2 through A-8.

(1) Blankinship, B. 1974. "Corps Seeks Answers to Environmental Challenges." World Dredging and Marine Construction, 10 (14).

MECHANICAL DREDGES

Generally, mechanical dredges remove bottom material with "buckets" which are then emptied into a barge for transport to a distant disposal site. (In a few cases, the material is not placed on a barge but deposition takes place immediately adjacent to the dredging site.) Tugs and barges are to transport the material and either bottom dumped at a selected aquatic site or pumped ashore. The different types of mechanical dredges are discussed below.

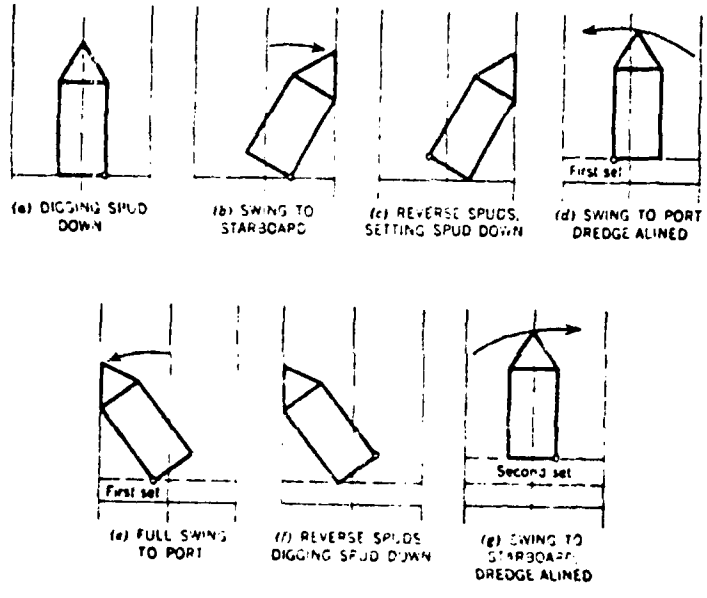


FIGURE A-1: PROCESS OF STEPPING DREDGE AHEAD

Source: Huston, J. 1967. "Dredging Fundamentals." J. Waterways & Harbors Div., August issue.

Bucket dredges consist of an endless chain of buckets which lift the bottom material to the surface where it is discharged upon the start of the bucket's return to the bottom. This equipment is used where large amounts of hard material have to be removed but is not used in San Francisco Bay. It should be noted that bucket dredges are not free-floating during their operations but are anchored at one corner by a spud.

The swinging of the dredge from side to side and advancing within the cut is controlled through anchor lines and by the spuds shown in Figure A-1. The main disadvantages of this equipment are: (1) having to operate off-anchor lines; (2) interference with navigation; and (3) its susceptibility to sea conditions. The main advantage is in being able to move large amounts of hard material at low cost.

The dipper dredge is a barge mounted power shovel (Figure A-2) which removes hard compacted materials and broken rocks from blasting operations. The movement or anchorage of the dredge during operation is also accomplished with spuds. The main disadvantage of the dipper dredge is its low production rate (not more than 400 cubic yards an hour) and therefore not competitive for San Francisco Bay work.

The clamshell dredge resembles a derrick mounted on a barge (Figure A-3). The bucket is lowered and raised by cables from a swinging boom and is placed in the "cut" by moving the boom vertically and horizontally. This equipment is best suited for dredging soft cohesive material in a confined area. Positioning the dredge is accomplished in the same manner used by the bucket and dipper dredges. A variation of the clamshell is the dragline dredge, which "casts" its bucket ahead and drags it back. Both of these dredges are used extensively in the construction and maintenance of levees and dikes. The clamshell is used extensively in San Francisco Bay, but the dragline is not.

HYDRAULIC DREDGES

Unlike mechanical dredges which "lift" the material, a hydraulic dredge sucks up the material through a pipe. This operation simultaneously accomplishes all three actions of a mechanical dredging operation: removal, transport, and deposition.

The plain suction pipeline dredge is the simplest of the hydraulic dredges. It has no cutterhead and is thereby limited to working free-flowing materials. The dredge material is propelled through a floating or sometimes submerged pipeline to a land impoundment area where the particulate matter settles out. The remaining effluent then passes over a weir and eventually returns to the waterway.

The cutterhead pipeline dredge is similar in operation to the plain suction dredge, but is equipped with a rotating cutter attached to the intake of the suction pipe (Figure A-4). The cutter is shaped like a basket and armed with sharp teeth which loosen and agitate the bottom material. The material can then be drawn into the suction pipe by a centrifugal pump and disposed in the same manner as the plain suction dredge.

Like mechanical dredges, the plain suction and cutterhead pipeline use "spuds" to both secure and propel themselves during dredging operations. Dredging is almost continuous. Pipelines may range in diameter from 12 inches to 36 inches. The 36-inch diameter pipe is capable of 50,000 cubic yards production per day. The main disadvantage of this type of dredge is the obstruction to navigation by the dredge and its pipelines. Advantages are its ability to remove compacted materials at reasonably low operation cost. This equipment is usually used on navigation projects, land reclamation, and mining operations.

The self-propelled hopper dredge is a trailing suction dredge which loads the bottom materials directly in hoppers aboard the dredge. The vessel usually has port and starboard trailing suction pipes and some are equipped with stern pipes. Each suction pipe has a draghead that is approximately five feet across that digs into and follows the bottom elevation. This pipe and drag assembly is known as a drag arm. The suction pipe is attached to the hull through a right-angle fitting which swivels,allowing the pipe to move vertically. For an operational sketch of a hopper, see Figure A-5. After the hoppers are filled, or an economic load is achieved, the dredge departs the dredging area for a select disposal site where the material is released through the bottom of the vessel into deep water. Some hopper dredges also can pump the material from the hoppers to a shore facility (which is known as "direct pumpout"). Unlike other dredges, hoppers are capable of operating in an ocean environment with swells running in excess of six feet. Daily production can exceed 60,000 cubic yards providing disposal is fairly close. The cost of hopper dredging is relatively low for short hauls but increases rapidly with long distances. The main disadvantage is that production is interrupted during transport and disposal operations.

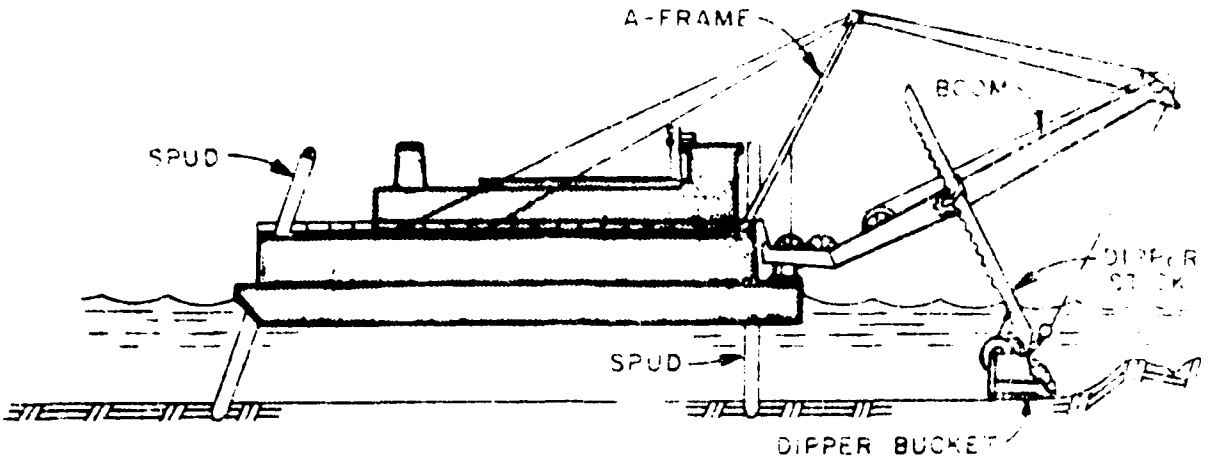


FIGURE A-2 Dipper Dredge

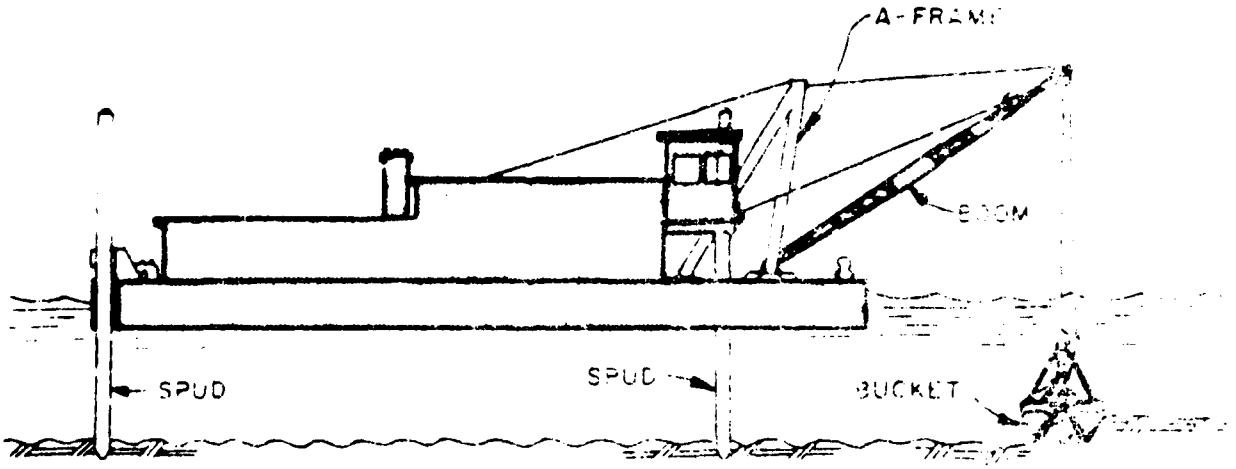


FIGURE A-3 Clamshell Dredge

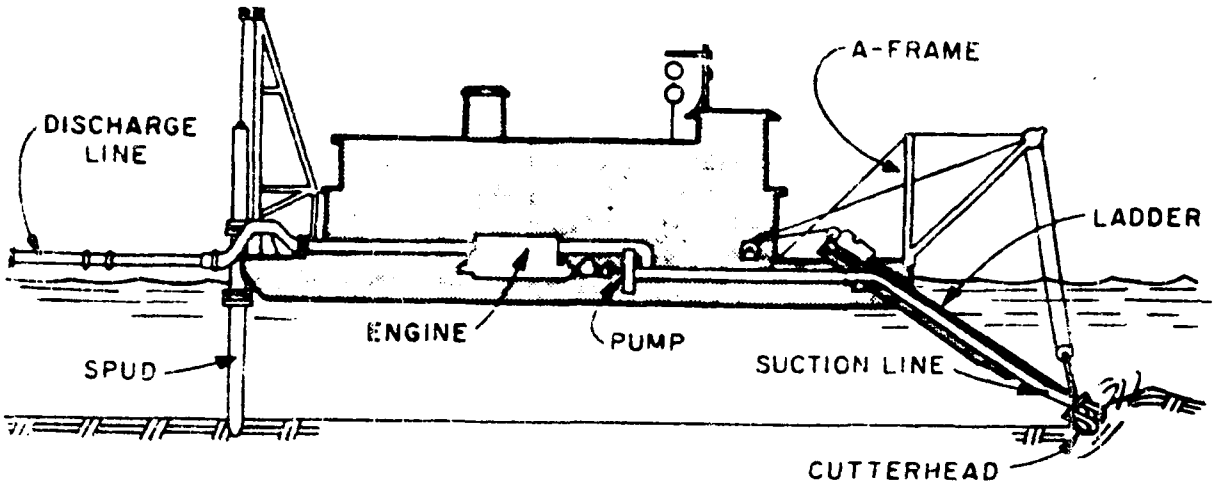
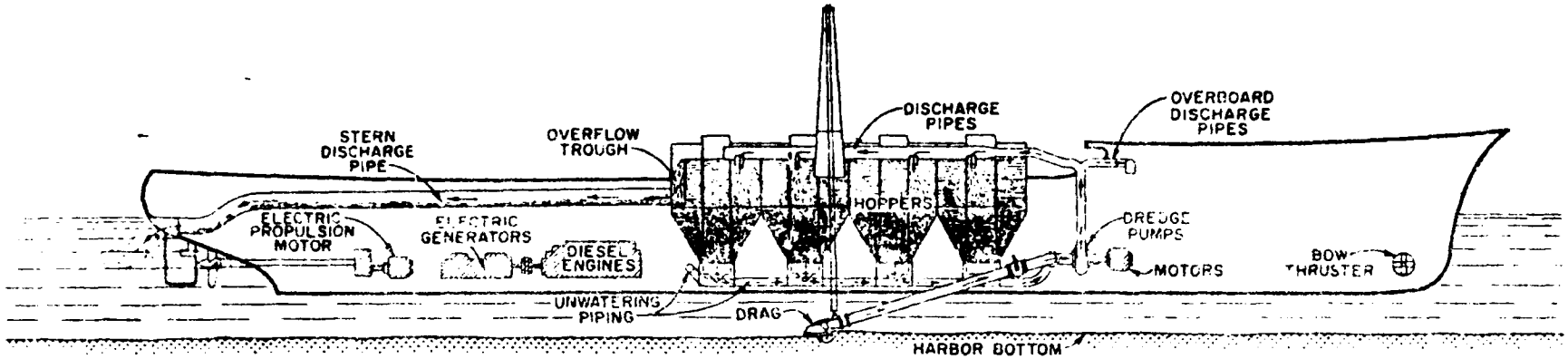
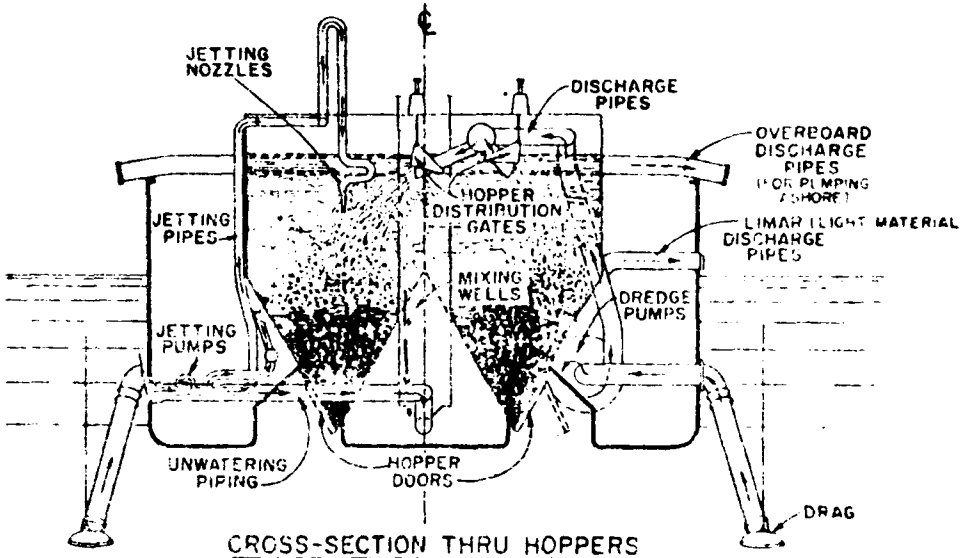


FIGURE A-4 Pipeline Dredge



LENGTHWISE SECTION



CROSS-SECTION THRU HOPPERS

SYMMETRICAL ABOUT ℄

OPERATIONAL SKETCH OF HOPPER DREDGE FIGURE A-5

APPENDIX B

MISCELLANEOUS SUPPORTING DOCUMENTS

APPENDIX B

MISCELLANEOUS DOCUMENTS

APPLICATION FOR A DEPARTMENT OF THE ARMY PERMIT

For use of this form, see EP 1145-2-1

The Department of the Army permit program is authorized by Section 10 of the River and Harbor Act of 1899, Section 404 of P. L. 92-500 and Section 103 of P. L. 92-532. These laws require permits authorizing structures and work in or affecting navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Information provided in ENG Form 4345 will be used in evaluating the application for a permit. Information in the application is made a matter of public record through issuance of a public notice. Disclosure of the information requested is voluntary; however, the data requested are necessary in order to communicate with the applicant and to evaluate the permit application. If necessary information is not provided, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and checklist) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

1. Application number (To be assigned by Corps)	2. Date	3. For Corps use only
1859-24	05 JUNE 1979 Day Mo. Yr.	DATE RECEIVED: 18 JUN 79

4. Name and address of applicant.

Commander
Mare Island Naval Shipyard
Vallejo, California 94592

Telephone no. during business hours
A/C (707) 646-4405
A/C (707) 646-2247

5. Name, address and title of authorized agent.

H. A. CRISP, Public Works Officer
Mare Island Naval Shipyard
Vallejo, California 94592

Telephone no. during business hours
A/C (707) 646-3296
A/C (707) 646-4257

6. Describe in detail the proposed activity, its purpose and intended use (private, public, commercial or other, including description of the type of structures, if any to be erected on fills, or pile or float-supported platforms, the type, composition and quantity of materials to be discharged or dumped and means of conveyance, and the source of discharge or fill material. If additional space is needed, use Block 14. Dredge Mare Island Strait and Pinole Shoal to 35 feet below MLLW to accommodate passage of SSN 688 Class Submarines. See attachments "A" and "B" for details and justifications. Dredge spoil material will be disposed of at the San Pablo Bay and Carquinez Strait disposal sites; the estimated quantity is: Pinole Shoal - 100,000 c. y. Mare Island Strait - 1.5 million c. y. . Dredging will be done and material transported by the Corps of Engineers hopper dredge and/or by contract-clam-shell dredge and transported by barge to the disposal sites.

7. Names, addresses and telephone numbers of adjoining property owners, lessees, etc., whose property also adjoins the waterway.

a. City of Vallejo, City Hall, Phone
b. Sperry Flour Co., General Mill Inc., Vallejo, California (707) 643-4569
c. Kaiser Steel Corp., 121 Sonoma Blvd, Vallejo, California (707) 643-1033
d. Mare Island Ferry Co. Georgia Street Wharf, Vallejo, California (707) 643-7542
e. Vallejo Yacht Club, 495 Mare Island Way, Vallejo, California (707) 552-9429
f. Vallejo Sanitation and Flood Control District, 450 Ryder Street Vallejo, California (707) 644-8949
g. City of Pinole, (415) 758-3012
h. Contra Costa County, (415) 372-2035

8. Location where proposed activity exists or will occur.

Address: Pinole Shoal and Mare Island Strait

Tax Assessors Description: (if known)

Map No. | Subdiv. No. | Lot No.

Street, road or other descriptive location
Pinole and Vallejo

Sec. | Twp. | Rge.

In or near city or town
Vallejo CA 94592
County State Zip Code

9. Name of waterway at location of the activity.

Mare Island Strait

10. Date activity is proposed to commence. 1981 January

Date activity is expected to be completed 1981 April

11. Is any portion of the activity for which authorization is sought now complete? ☐ YES ☒ NO

If answer is "Yes" give reasons in the remark section. Month and year the activity was completed ______________________. Indicate the existing work on the drawings.

12. List all approvals or certifications required by other federal, interstate, state or local agencies for any structures, construction, discharges, deposits or other activities described in this application.

Issuing Agency	Type Approval	Identification No.	Date of Application	Date of Approval

13. Has any agency denied approval for the activity described herein or for any activity directly related to the activity described herein?

☐ Yes ☒ No (If "Yes" explain in remarks)

14. Remarks (Checklist, Appendix [illegible] for additional information required for certain activities).

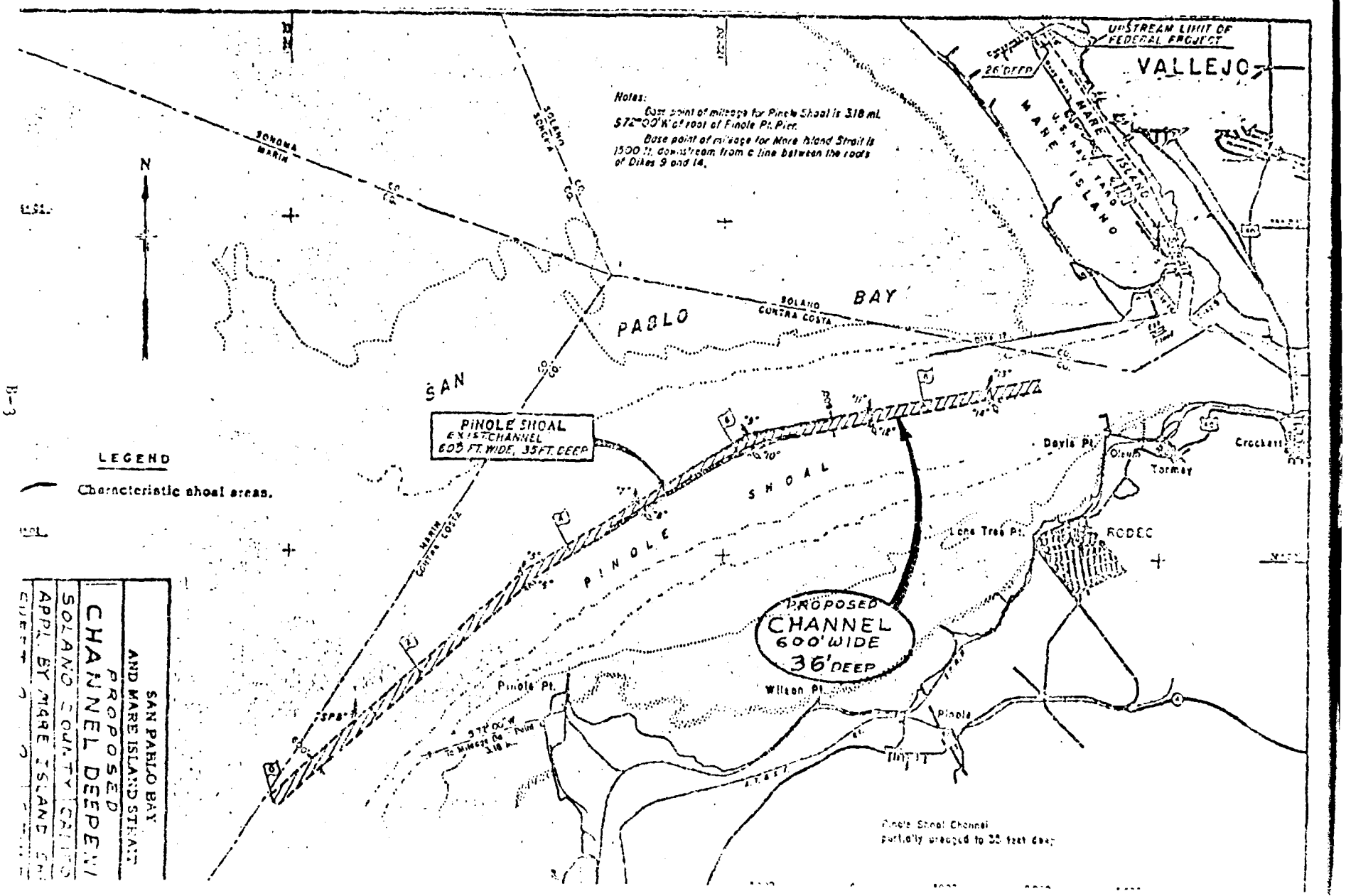
15. Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities.

H. A. CRISP

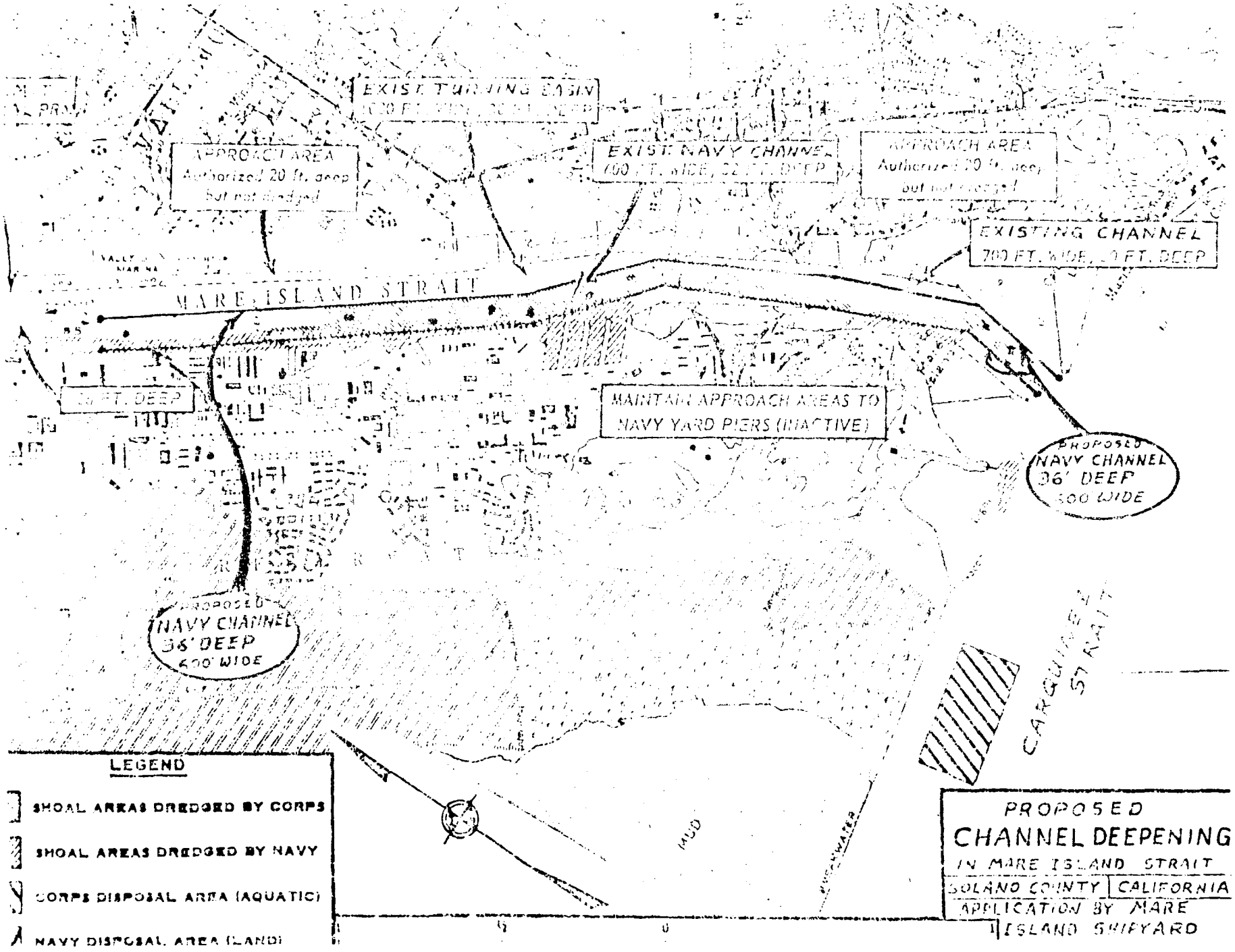
Signature of Applicant or Authorized Agent

The application must be signed by the applicant; however, it may be signed by a duly authorized agent (named in Item 5) if this form is accompanied by a statement by the applicant designating the agent and agreeing to furnish upon request, supplemental [illegible] support of the application.

[illegible] provides that: Whoever, in any manner within the jurisdiction of any department or agency of [illegible] and willfully falsifies, conceals, [illegible] by any trick, scheme, or device a material fact or makes [illegible] or fraudulent statements or representations [illegible] or uses any false writing or document knowing [illegible] any false fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or [illegible] years, or both. Do not send a [illegible] fee with this application. The appropriate fee [illegible] permit is issued.


Notes:
Base point of mileage for Pinole Shoal is 318 mi. S72°00'W of root of Pinole Pt. Pier.
Base point of mileage for Mare Island Strait is 1500 ft. downstream from a line between the roots of Dikes 9 and 14.
UPSTREAM LIMIT OF FEDERAL PROJECT
VALLEJO
MARE ISLAND
U.S. NAVY YARD
SONOMA MARIN
SOLANO CONTRA COSTA
SAN PABLO BAY
PINOLE SHOAL
EXIST. CHANNEL
600 FT. WIDE, 35 FT. DEEP
PINOLE SHOAL
PROPOSED
CHANNEL
600' WIDE
36' DEEP
Davis Pt.
Tormey
Crockett
Lone Tree Pt.
RODEO
Pinole Pt.
Wilson Pt.
Pinole
Pinole Shoal Channel
Partially dredged to 35 feet deep
N
LEGEND
Characteristic shoal areas.
SAN PABLO BAY
AND MARE ISLAND STRAIT
PROPOSED
CHANNEL DEEPEN
SOLANO COUNTY
APPL. BY MARE ISLAND

B-3


EXIST TURNING BASIN
APPROACH AREA
Authorized 20 ft. deep
but not dredged
EXIST NAVY CHANNEL
APPROACH AREA
EXISTING CHANNEL
700 FT. WIDE
MARE ISLAND STRAIT
MAINTAIN APPROACH AREAS TO
NAVY YARD PIERS (INACTIVE)
PROPOSED
NAVY CHANNEL
36' DEEP
600 WIDE
PROPOSED
NAVY CHANNEL
36' DEEP
600' WIDE
CARQUINEZ STRAIT
MUD
FRESHWATER
LEGEND
SHOAL AREAS DREDGED BY CORPS
SHOAL AREAS DREDGED BY NAVY
CORPS DISPOSAL AREA (AQUATIC)
NAVY DISPOSAL AREA (LAND)
PROPOSED
CHANNEL DEEPENING
IN MARE ISLAND STRAIT
SOLANO COUNTY | CALIFORNIA
APPLICATION BY MARE
ISLAND SHIPYARD

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105

SPNCO-RE

11 October 1979

PUBLIC NOTICE NUMBER 12859-24 RESPONSE REQUIRED BY: 13 November 1979

TO WHOM IT MAY CONCERN:

1. The Commander, Mare Island Naval Shipyard, Vallejo, California 94592 (telephone 707-646-3296), has applied for a Department of the Army authorization to dredge Pinole Shoal in San Pablo Bay, and Mare Island Strait to a depth of 36 feet below mean lower low water (MLLW) in Vallejo, counties of Contra Costa and Solano, State of California. This application is being processed pursuant to the provisions of Section 10 of the River and Harbor Act of 1899 (33 U.S.C. 403) and Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344).

2. The applicant proposes to dredge approximately 100,000 cubic yards of material from Pinole Shoal, and approximately 1.5 million cubic yards of material from Mare Island Strait to establish a depth of 36 feet below mean lower low water (MLLW). (The channel is presently maintained by the Corps of Engineers at a depth of 32 feet below MLLW.) The new depth would improve the navigational safety of the latest Naval Ship designs and should help the Shipyard's dredging operations at the berths and piers. The dredging would be accomplished by hopper dredge and/or by contract clamshell dredge and transported by barge to existing San Francisco Disposal Sites No. 9 (Carquinez Strait) and No. 10 (San Pablo Bay).

3. The applicant has been informed to contact the San Francisco Bay Conservation and Development Commission (BCDC) for a permit, and has been informed to notify the Regional Water Quality Control Board, San Francisco Bay Region to determine the need for State water quality certification. If the State Water Resources Control Board determines that this project is consistent with the California Water Quality Control Plan, Requirements adopted by the Regional Board and Sections 301, 302, 303, 306 and 307 of the Clean Water Act, the State will issue a Certificate of Conformance with Water Quality Standards to the project proponent. Those parties concerned with any water quality problems that may be associated with this project should write to Fred H. Dierker, Executive Officer, California Regional Water Quality Control Board, San Francisco Bay Region, 1111 Jackson Street, Oakland, California 94607, by the close of the comment period of this public notice.

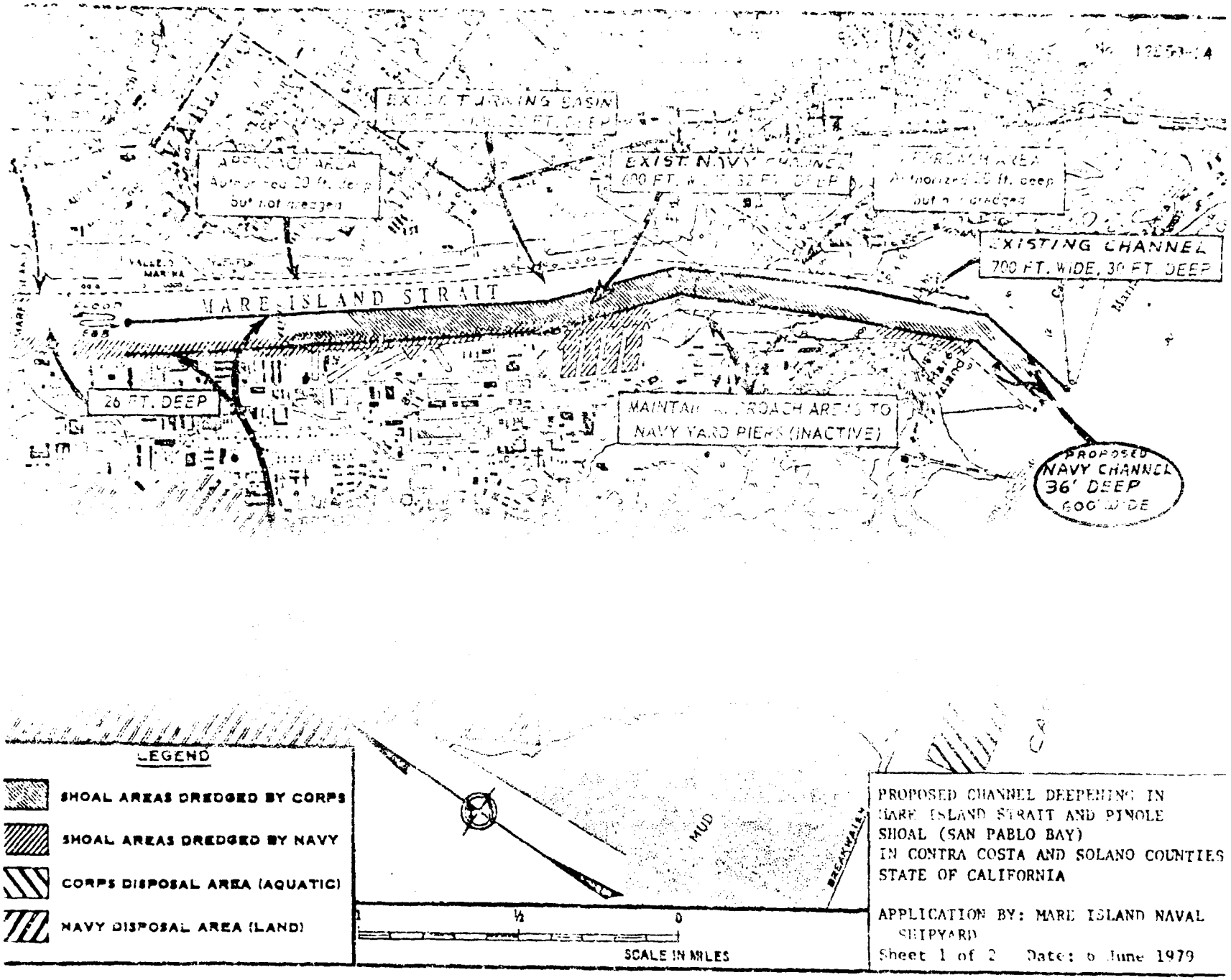
SPNCO-RE
PUBLIC NOTICE NUMBER 12859-24

4. In accordance with the requirements of the National Environmental Policy Act of 1969 (Public Law 91-190), the Corps of Engineers has made a preliminary assessment of the environmental, engineering, economic, and social aspects of the proposed activity, and has determined that an Environmental Statement (ES) will be necessary. These aspects will be discussed in detail in the ES. Requests for copies of the draft ES should be submitted in writing and directed to the attention of the Environmental Branch of this office, at the address given above. The activity does not involve property listed in the National Register of Historic Places, or Registry of National Landmarks.

5. A permit issued by the Department of the Army does not give any property rights either in real estate or materials, or any exclusive privileges; and does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it eliminate the necessity of obtaining State assent to work authorized. The decision by the Corps of Engineers whether to issue a permit will be based on an evaluation of the probable impact of the activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered; among those are conservation, economics, aesthetics, general environmental concerns, historic values, fish and wildlife values, flood damage prevention, land use, navigation, recreation, water supply, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people.

6. Evaluation of this activity's impact on the public interest will also include application of the guidelines promulgated by the Administrator of the Environmental Protection Agency under Section 404(b) of the Clean Water Act (CWA) 33 U.S.C. Section 1344(b), and (if applicable) Section 102(a) of the Marine Protection, Research, and Sanctuaries Act of 1972, 33 U.S.C. Section 1412(a). Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider this application. Requests for public hearings shall state, with particularity, the reason for holding a public hearing.

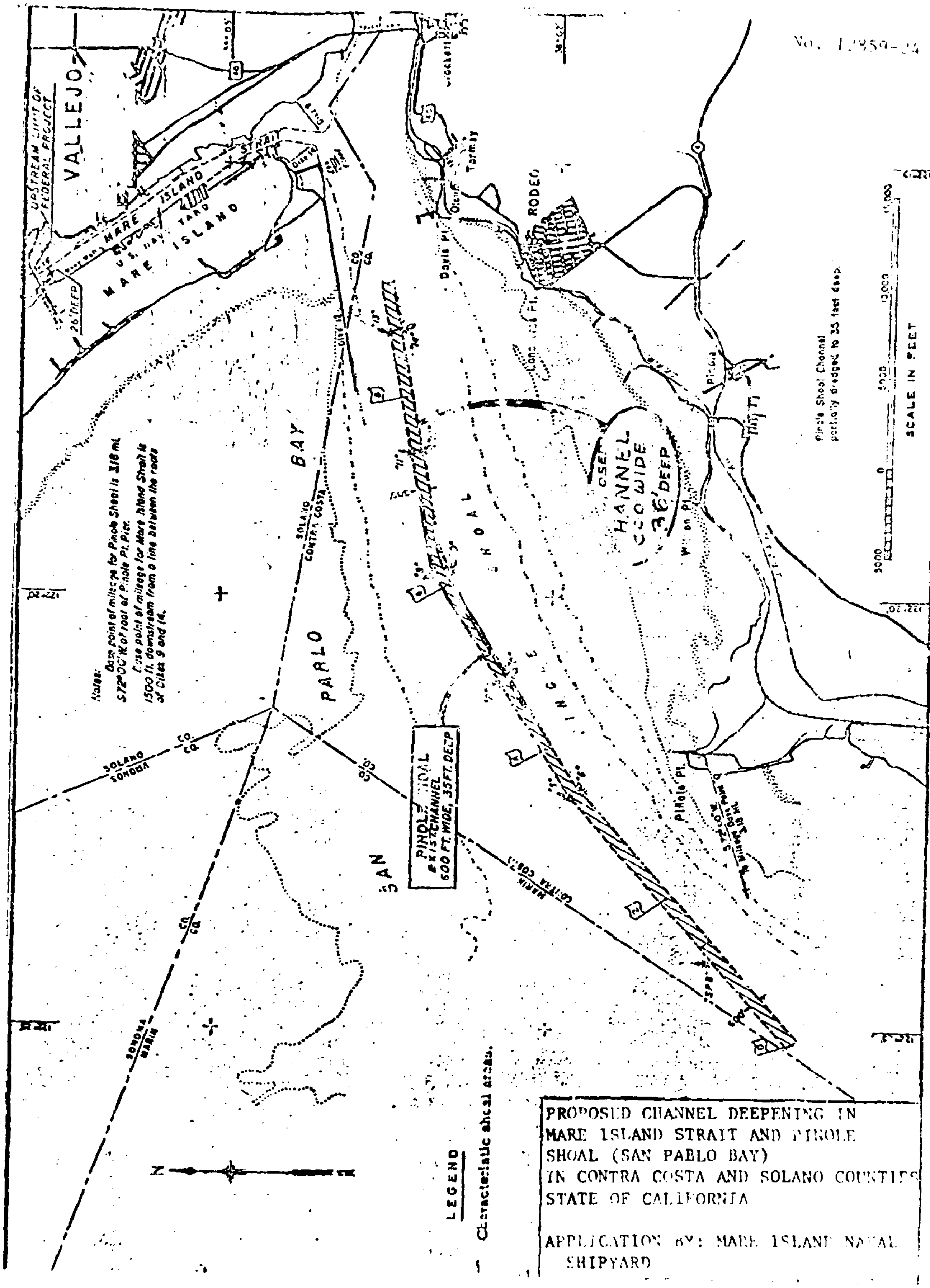
7. Interested parties may submit in writing any comments that they may have on this activity. Comments should include the number and the date of this notice and should be forwarded so as to reach this office within the commenting period. Comments should be sent to: Colonel John M. Adsit, District Engineer. Additional details may be obtained by contacting the applicant whose address and telephone numbers are indicated in the first paragraph of this notice, or by contacting Ms. Karen Mason of our office (telephone 415-556-6980). It is the Corps policy to forward any such comments which include objections to the applicant for resolution or rebuttal. Details on any changes of a minor nature which are made in the final permit action will be provided on request.



PROPOSED CHANNEL DEEPENING IN
MARE ISLAND STRAIT AND PINOLE
SHOAL (SAN PABLO BAY)
IN CONTRA COSTA AND SOLANO COUNTIES
STATE OF CALIFORNIA

APPLICATION BY: MARE ISLAND NAVAL
SHIPYARD

Sheet 1 of 2 Date: 6 June 1979



PROPOSED CHANNEL DEEPENING IN MARE ISLAND STRAIT AND PINOLE SHOAL (SAN PABLO BAY) IN CONTRA COSTA AND SOLANO COUNTIES STATE OF CALIFORNIA

APPLICATION BY: MARE ISLAND NAVAL SHIPYARD

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105

SPNED-EC

21 April 1981

Dr. Knox Mellon
State Historic Preservation Officer
State Office of Historic Preservation
Department of Parks and Recreation
P.O. Box 2390
Sacramento, CA 95811

Attn: Mr. Mike Rondeau

SUBJECT: CULTURAL RESOURCE SURVEY INFORMATION REQUEST

The San Francisco District, Corps of Engineers is conducting an investigation into the cultural resources for the proposed project described below. The lists and surveys indicated below have been consulted to identify any recorded cultural resources located in the vicinity of the project. Please consult your records and provide us with any additional information you may have regarding cultural resources pertinent to the proposed undertaking.

I. PROJECT DESCRIPTION: (For location, see attached maps).

DREDGING: MARE ISLAND NAVAL SHIPYARD

1) Dredging approximately 1,600,000 cubic yards of material from Pinole Shoal and Mare Island Strait to establish a depth of 36 feet below MLLW. The purpose of dredging is to allow deeper draft vessels access to the shipyard.

2) Disposal of dredged material at existing aquatic disposal sites in San Pablo Bay and the Carquinez Straits, or by pipeline to Island No. 1 within an area known as the Cullinan Ranch, located immediately northwest of Mare Island Shipyard.

II. PROPERTIES IDENTIFIED:

A. NRHP Properties (listed or determined eligible) Month April Year 1981 (Mare Island Naval Shipyard)	__ NO	XX YES
B. California Historical Landmarks Month _____ Year 1979	XX NO	____ YES
C. California Points of Historical Interest	____ NO	____ YES
D. California Inventory of Historic Resources Properties	____ NO	____ YES
E. Recorded Archaeological Sites	____ NO	____ YES
F. Other Properties	____ NO	____ YES

21 April 1981

This information will be used in the environmental assessment of the proposed project.

If we have not received your reply within 30-days of the date of this request, we shall assume that no additional data are available.

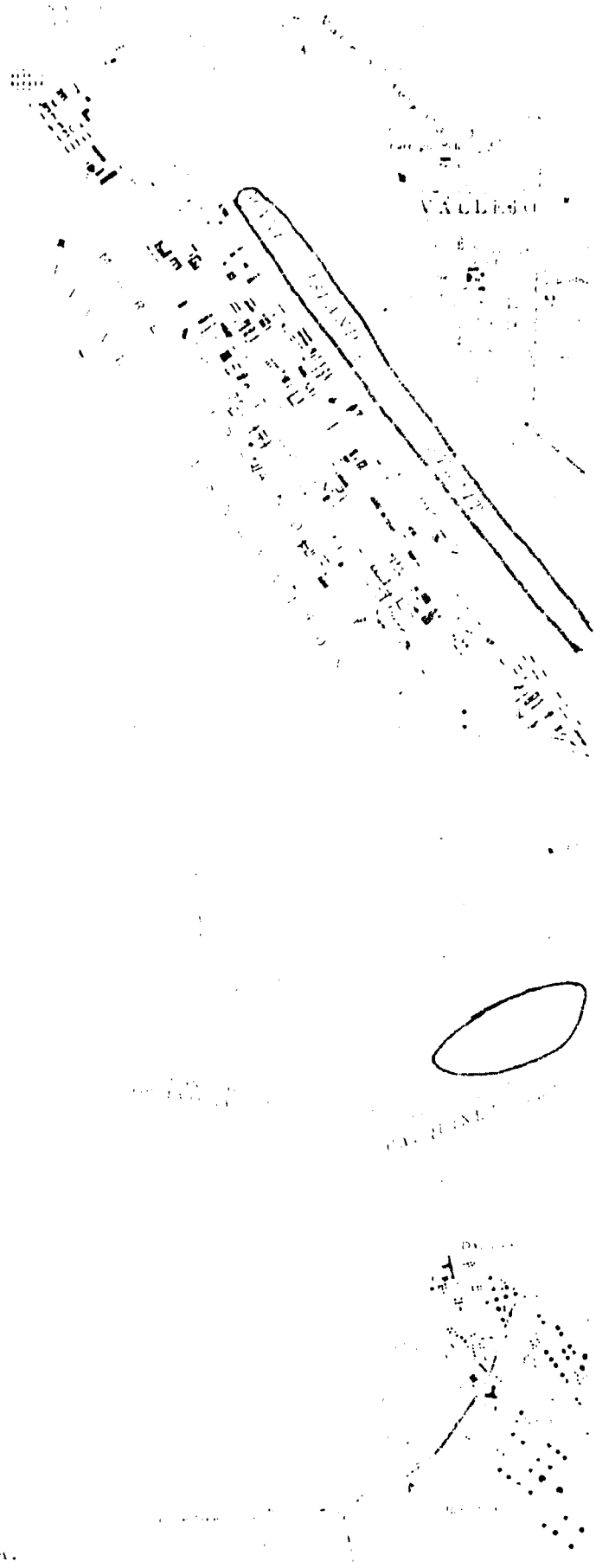
A provision shall appear in Corps environmental assessment documents released for public review which shall express the results of this formal coordination between our agencies.

Jay K. Soper
Chief, Engineering Division

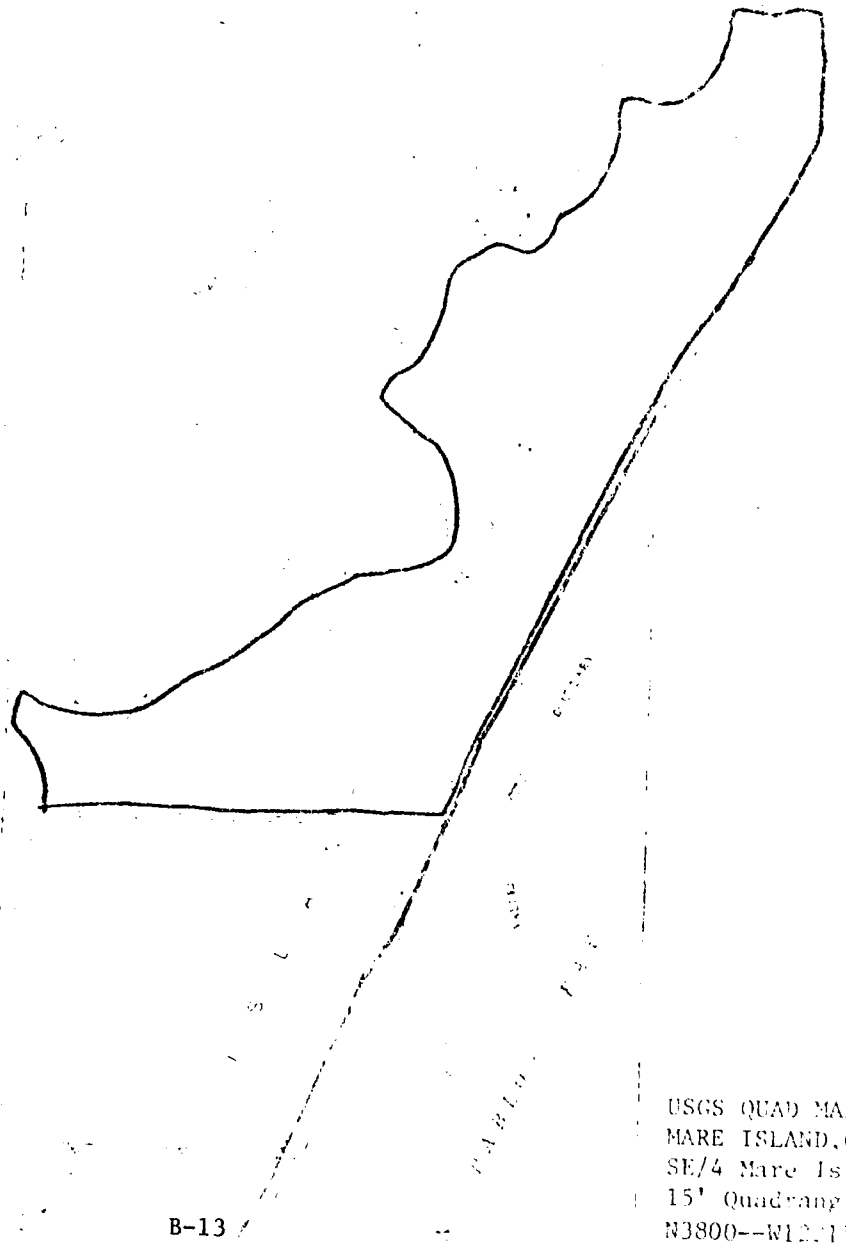
4 Inclosures
Maps

_____ Additional data attached

Dr. Knox Mellon
State Historic Preservation Officer



USGS QUAD MAP
MARE ISLAND, CA.
SE/4 Mare Island
15' Quadrangle
N3800--W12215/7.5



USGS QUAD MAP
MARE ISLAND, CA.
SE/4 Mare Island
15' Quadrangle
N3800--W12215/7.5

AD-A102 777 CORPS OF ENGINEERS SAN FRANCISCO CA SAN FRANCISCO DI--ETC F/G 13/2
U. S. NAVY DEEPENING OF PINOLE SHOAL AND MARE ISLAND STRAIT REG--ETC(U)
JUL 81

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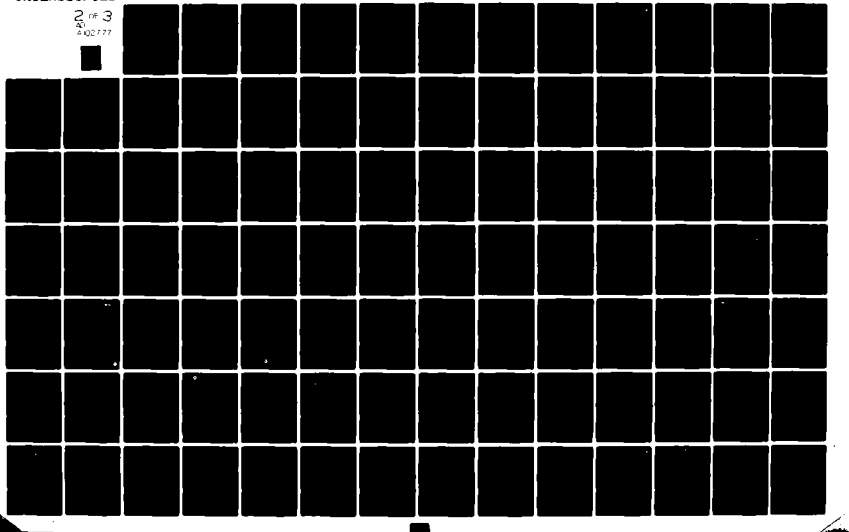
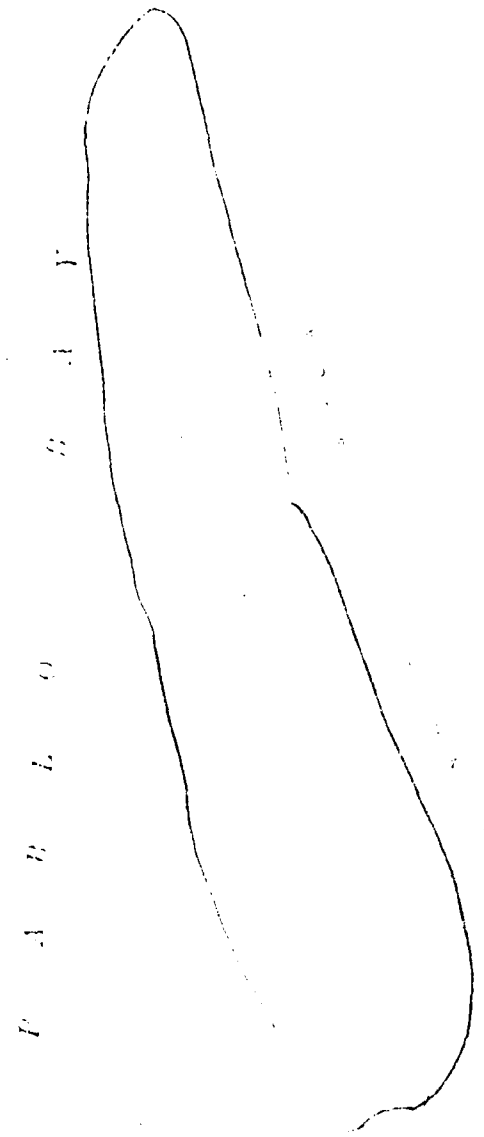




USGS QUAD MAP
MARE ISLAND, CA.
SE/4 Mare Island
15' Quadrangle
N3800--W12215/7.5

USGS QUAD MAP
PETALUMA POINT, CA.
N3800--W12222.5/7.5

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105

SPNED-E

21 April 1981

California Archaeological Site Survey
Regional Office
Department of Anthropology
Sonoma State University
Rohnert Park, California 94928

Dear Sirs/Mesdames:

The U. S. Army Engineer District, San Francisco, requests that your office conduct a literature search for the area indicated in yellow on the inclosed maps. Please send the results to Mark Rudo of my staff at the address given below.

Mark Rudo, Environmental Branch (SPNED-EC)
U. S. Army, Corps of Engineers,
San Francisco District
211 Main Street
San Francisco, California 94105

This request is made in accordance with the provisions of Purchase Order DACW07-80-E-2182 of 2 July 1980, (annual use fee). Should the requested service cost more than $30.00, please contact Mark Rudo, at (415) 556-5413.

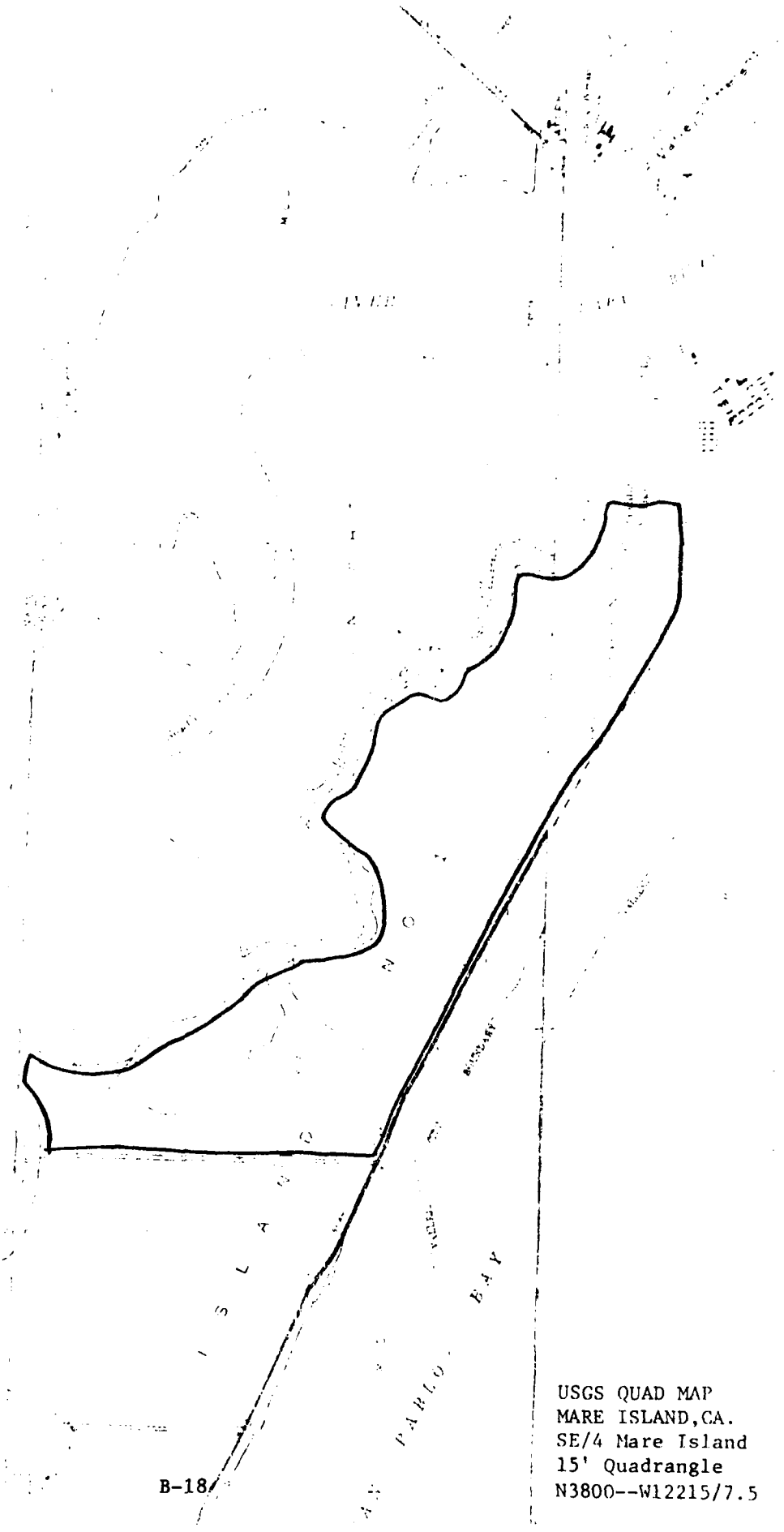
Thank you for your cooperation.

Sincerely,

JAY K. SOPER
Chief, Engineering Division

4 Inclosures
Maps

USGS QUAD MAP
MARE ISLAND, CA.
SE/4 Mare Island
15' Quadrangle
N3800--W12215/7.5



USGS QUAD MAP
MARE ISLAND,CA.
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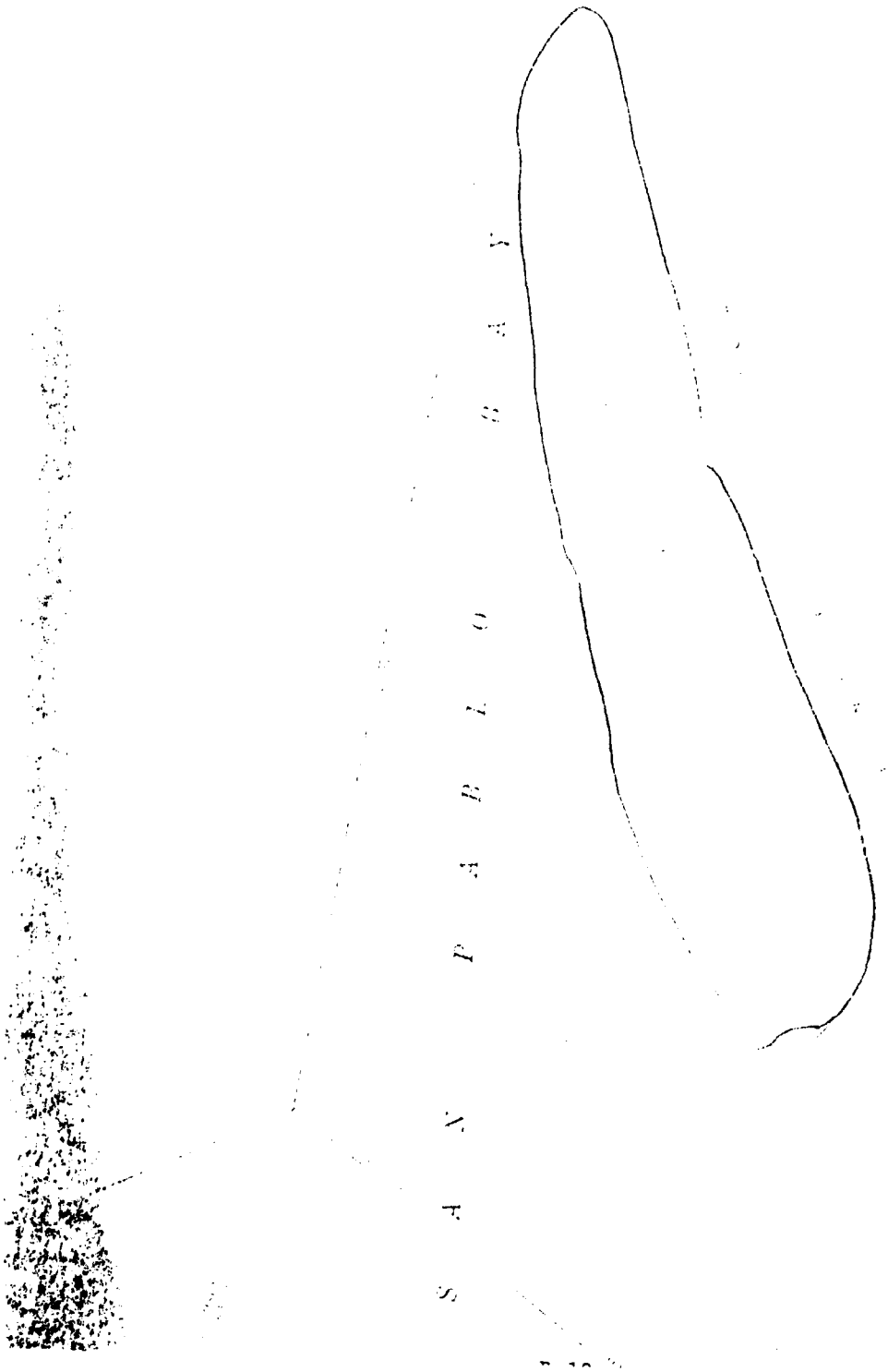


USGS QUAD MAP
MARE ISLAND, CA.
SE/4 Mare Island
15' Quadrangle
N3800--W12215/7.5

USGS QUAD MAP
PETALUMA POINT, CA.
N3800--W12222.5/7.5

SHIPPING CONTAINER TAG → 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

REQUISITION AND INVOICE/SHIPPING DOCUMENT

	1 1 — 13 May 1981	SFD 81-1605
ENVIRONMENTAL BRANCH, ENGINEERING DIVISION	15 June 1981	
CHIEF, PROCUREMENT AND SUPPLY DIVISION		
	RODERICK A. CHISHOLM II	
	Act Ch, Environmental Br	
U. S. Army Engineer District, San Francisco Corps of Engineers 211 Main Street San Francisco, California 94105		

96x3123 O&M, General, CE, Civil, S04-203 (CZ010344R020000)	OBJECT CLASS	EXPENDITURE ACCOUNT	CHARGEABLE ACTIVITY	BUREAU CONTROL ACTIVITY NO	BUREAU CONTROL NO	AMOUNT

ITEM NO.	FEDERAL STOCK NUMBER DESCRIPTION AND CODING OF MATERIEL AND/OR SERVICES	UNIT OF ISSUE	QUANTITY REQUESTED	SUPPLY ACTION	TYPE ITEM	ITEM NO.	UNIT PRICE	TOTAL COST
	Department of Anthropology ATTN: Mary Anne Russo California State University, Sacramento Sacramento, CA 95819 The U.S. Army Engineer District, San Francisco, requests your office to conduct a literature search for the area indicated in yellow on the inclosed maps. Send results to: Mark Rudo, Environmental Branch (SPNED-EC) U. S. Army, Corps of Engineers, San Francisco Dist. 211 Main Street, Room 809 San Francisco, California 94105 For information call Mark Rudo, (415) 556-5413. Also, if the requested service exceeds $30.00, contact Mr. Rudo.							Approx. $30.00

MARK AND ROGER HAVE COPIES WITH INCLOSURES.

SPECIAL HANDLING

				QUANTITIES RECEIVED EXCEPT AS NOTED	DATE	BY	GRAND TOTAL
				QUANTITIES RECEIVED EXCEPT AS NOTED	DATE	BY	GRAND TOTAL
				POSTED	DATE	BY	

DD FORM 1149

51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

STATE OF CALIFORNIA—THE RESOURCES AGENCY

EDMUND G. BROWN JR., Governor

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
POST OFFICE BOX 2390
SACRAMENTO, CALIFORNIA 95811

May 11, 1981

Col. Paul Bazilwich, Jr.
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, CA 94105

RE: U.S. Navy Deeping of Pinole Shoal and Mare Island Strait
Regulatory Permit Application

Dear Col. Bazilwich:

We are in receipt of the above referenced undertaking(s). Thank you for the opportunity to comment pursuant to 36 CFR 800.

Based on the information provided in the report(s) noted above I concur that no properties included in or eligible for inclusion in the National Register of Historic Places should be affected by the proposed undertaking(s).

It should be remembered that compliance with 36 CFR 800.7 is required if presently unknown cultural resources should be discovered during subsequent work.

If there are any questions, please feel free to contact Michael Rondeau, Staff Archeologist, at (916) 445-6766.

Sincerely,

Knox Mellon

Dr. Knox Mellon
State Historic Preservation Officer
Office of Historic Preservation

California Archaeological Site Survey

Regional Office

ALAMEDA
CONTRA COSTA MARIN
DEL NORTE MENDOCINO
HUMBOLDT NAPA
LAKE SONOMA

Department of Anthropology
Sonoma State University
Rohnert Park, CA 94928

(707) 664-2494

4 May 1981

Mark Rudo
Environmental Branch (SPNED-EC)
US Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105

re: Archaeological Records Search for a Dredging Project in San Pablo Bay, Contra Costa County, California.

Dear Mr. Rudo:

Per your request of 21 April 1981, an archaeological records search of the above referenced project area was conducted. The records search consisted of a review of pertinent archaeological maps and literature on file at the Northwest Regional Office (see Literature Reviewed).

There were no previously recorded archaeological sites situated within the project areas, nor had the parcels been subjected to a cultural resources field survey. The subject parcels did not have an environmental setting similar to the setting of other archaeological sites in the area. Therefore, the subject parcels should be considered to be within an area of low archaeological sensitivity and further archaeological study is not recommended at this time.

For parcels located within Solano County, please contact:

Marianne Russo
Anthropology Department
CSU Sacramento
6000 J Street
Sacramento, CA 95819

Thank you for using our services. Please sign and return the enclosed form. If you have any questions regarding this recommendation, please call Michele Lanigan at the Northwest Regional Office.

Sincerely,

Gloria Collins (by AA)

Gloria Collins
Coordinator

GLC:ML/cwo
encl.

Literature Reviewed

In addition to the archaeological maps and site records on file at the Northwest Regional Office of the California Archaeological Site Survey, the following literature was reviewed:

Bickel, Polly McWhorter
1976 Toward a Prehistory of the San Francisco Bay Area: The Archaeology of Sites Ala-328, Ala-13, and Ala-12. University Microfilms International, Ann Arbor, Michigan.

California Inventory of Historic Resources
1976 State of California Department of Parks and Recreation, Sacramento.

National Register of Historic Places (Annual listing and 1980 supplements)
1979 Federal Register., Vl. 44, No. 26. General Services Administration,
1980 Washington.

Nichols, Donald R. and Nancy A. Wright
1971 Preliminary Map of Historic Margins of Marshlands, San Francisco Bay, California. US Geological Survey.

Preliminary Historic Resources Inventory, Contra Costa County, California.
1976 Contra Costa County Planning Department, Martinez, California.

California Archeological Site Survey

Regional Office

AMADOR
COLUSA SIERRA
EL DORADO SOLANO
NEVADA SUTTER
PLACER YOLO
SACRAMENTO YUBA

Department of Anthropology
California State University, Sacramento
6000 J Street, Sacramento, CA 95819

(916) 454-6217

May 30, 1981

Mark Rudo
Environmental Branch (SPNED-EC)
US Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105

RE: RECORD SEARCH ADDENDUM TO DREDGING PROJECT IN SAN PABLO BAY SOLANO AND CONTRA COSTA COUNTIES.

Dear Mr. Rudo,

As per the request of Ms. Ofelia Ramos of your office we are supplementing the record search done by the Regional Office at Sonoma for the Contra Costa portion of the project. The following information pertains to the Solano County portion of the project.

CULTURAL RESOURCES: No previously recorded prehistoric or historic sites are known for the immediate project areas as shown in orange on the attached map. There are several recorded sites in the general vicinity as shown in red. The only one in close proximity to the project is CA-Sol-232, for which there is a conflict of information concerning its location (this is also true for Sol-17 and 233). However, due to the nature of the project proposed and the fact that this site (originally recorded in 1907) has probably been essentially destroyed by the naval base contruction, it is very unlikely that the project will have any adverse effect on this archeological site. The yellow areas indicated previously surveyed properties (a listing is attached for your information). The only site of historic significance is the Mare Island Naval Station itself as described in the attached copies of historic references. Again, the nature of the project does not seem to be such that it would effect the integrity of the landmark.

RECOMMENDATIONS: In view of the above information and the fact that the subject areas are not environmentally conducive to cultural activity of most kinds we conclude also that the areas are of low sensitivity and thus we do not recommend any further archeological study at this time.

If during construction any unusual amounts of bone, stone or artifacts are noted, a professional archeologist should be retained to examine the find and determine its significance.

LITERATURE REVIEW: Reviewed were the official maps and records for archeological sites, the National Register of Historic Places (1980), California Inventory of Historic Resources (1976), California State Landmarks (1979), 1000 California Place Names (1969), and Historic Spots in California (1966).

We would appreciate it if you would sign the enclosed "Agreement of Confidentiality" form and return to us the YELLOW copy. Thank you.

If we can be of any further help please do not hesitate to call.

Sincerely,

Marianne L. Russo
Assistant Regional Officer

Enclosures

MLR:mlr

cc: Ofelia C. Ramos
Room 919
US Army Engineer District, SF

cc: Gloria Collins
Regional Office
Sonoma State University

PS: There will be no charge for this record search, as per our agreement.

APPENDIX C

PINOLE SHOAL/MARE ISLAND STRAIT
POLLUTION TESTING
ANALYSIS OF SEDIMENTS

PINOLE SHOAL/MARE ISLAND

POLLUTION TESTING

ANALYSIS OF SEDIMENTS

MARCH 1981

AUTHORIZATION

1. Results of tests reported herein were requested by DA Form 2544, No. E86-81-3010, dated 11 February 1981, from the San Francisco District.

PURPOSE

2. The purpose of this study was to determine the amount of specified pollutants in samples of bottom sediments and to determine the grain size distribution.

SAMPLES

3. Sediment samples in plastic tubes and water samples in cubitaners were received from 6 to 10 February 1981.

TEST METHODS

4. a. Elutriate. Petroleum hydrocarbons, oil and grease, PCB, total identifiable chlorinated hydrocarbons, mercury, cadmium, lead, zinc, and copper were run according to "Ecological Evaluation of Proposed Discharge of Dredge Material into Ocean Waters," by EPA/Corps of Engineers. The elutriation was accomplished using compressed air.

b. Particle size, Engineer Manual EM 1110-2-1906.

TEST RESULTS

5. The sediment analysis methodology and data are presented as follows:
   a. Sediment analysis methodology.
   b. Sediment sample locations.
   c. Tables 1 and 2 reflect the test results for the Liquid Phase Chemical Analysis of Pinole Shoal and Mare Island respectively.
   d. Tables 3 and 4 compare the Liquid Phase Chemical Analysis to the California State Water Quality Control objective.
   e. Eng Forms 2087 and SPD Form 66 show the results of the grain size distribution and unit weight.

SEDIMENT ANALYSIS

METHODOLOGY

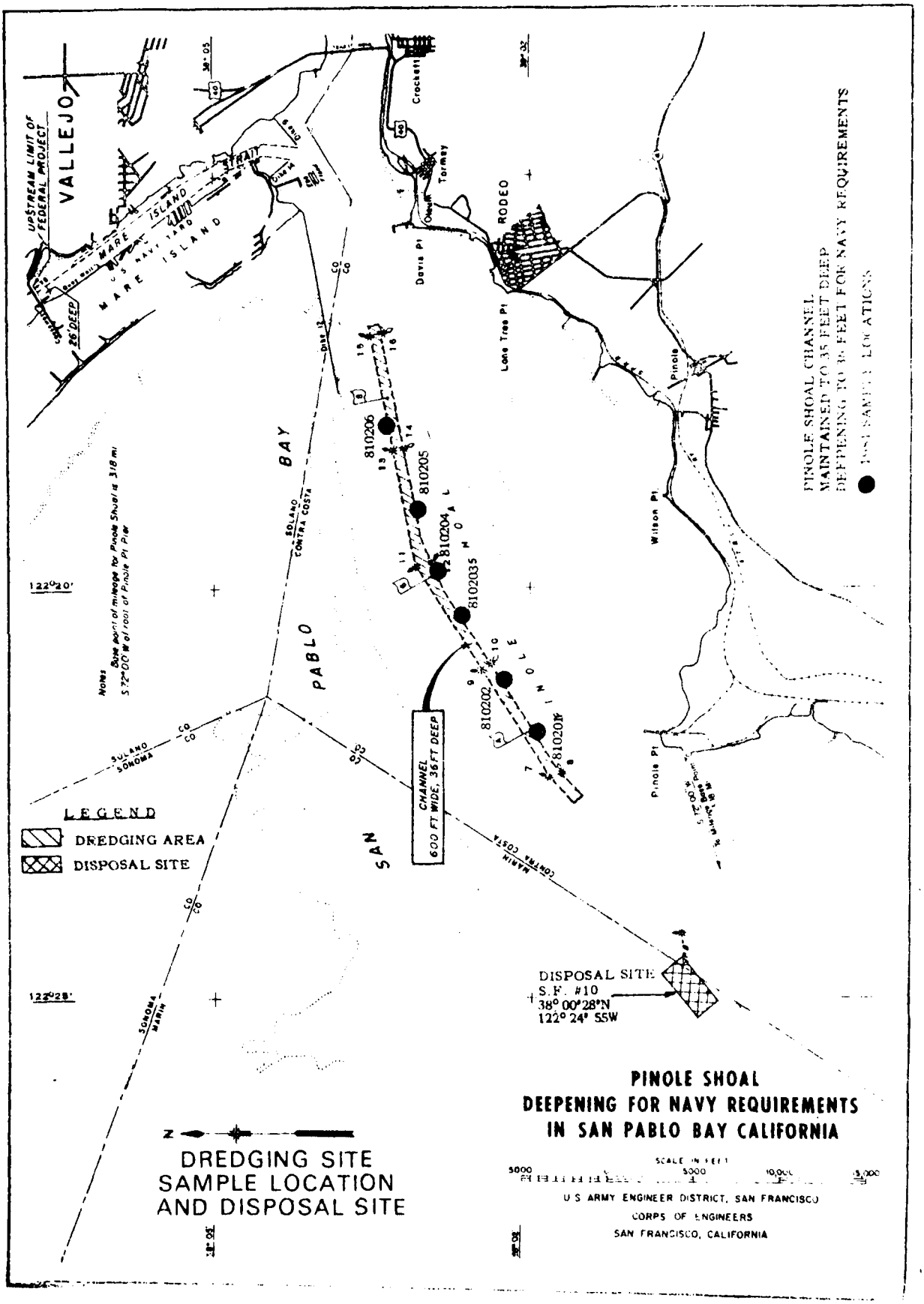
Material proposed for discharge into San Francisco Bay under Department of the Army permit application and Public Notice No. 12859-24 was evaluated under the Supplemental Regional Procedure for Discharge of Dredged or Fill Material made available by Public Notice No. 78-1 issued by the U.S. Army Corps of Engineers, San Francisco District on 30 July 1979.

These supplemental procedures are used in conjunction with the U.S. Environmental Protection Agency's (EPA) 1975 guidelines (40 CFR 230) and the Corps regulations (33 CFR 320-329) and are applicable only to Section 404 discharges in waters under the jurisdiction of the San Francisco District.

Proposed dredged material from Pinole Shoal and Mare Island Strait did not meet any of the exclusion categories to further testing (reference paragraph II C(1) of PN 78-1). Sediment samples from the proposed Pinole Shoal and Mare Island Strait dredge sites and water from the San Pablo Bay (SF#10) and Carquinez Strait (SF#9) aquatic disposal sites were tested and evaluated under paragraph II.c.2. Sediments from the proposed dredge sites were elutriated with the respective aquatic disposal site waters (i.e. receiving waters) and then chemically tested for oil and grease, residual petroleum hydrocarbons, mercury (Hg),cadmium(Cd), lead (Pb), copper(Cu), zinc(Zn), polychlorinated biphenyls(PCB), and total identifiable chlorinated hydrocarbons(TICH). Mean concentration values of the dredge sites were compared to mean values of chemical concentrations in the water of the respective disposal sites and to the State Water Quality Control Criteria for ocean waters of California.

Since the mean concentrations of chemicals in both the elutriate of the proposed dredged material at Pinole Shoal and Mare Island Strait and in the water of the respective disposal sites were either at detection limits or less than the State Water Quality Control Criteria, no calculation for dilution (mixing) purposes was necessary for oil and grease, mercury, cadmium, lead, copper, zinc, and PCB-TICH. There is no State Water Quality control objective for the residual petroleum hydrocarbon contaminant. However, there were no detectable levels of residual petroleum hydrocarbons at either the Pinole Shoal-Mare Island Strait dredge sites or at the San Pablo Bay (SF#10)-Carquinez Strait (SF#9) aquatic disposal sites. Therefore, no further testing is required.

Based upon the above test results and analysis, it is determined that the proposed dredged material from Pinole Shoal and Mare Island Strait is not contaminated and that open water disposal of such material will have no adverse impact on the aquatic environment.


VALLEJO
UPSTREAM LIMIT OF FEDERAL PROJECT
MARE ISLAND
U.S. NAVY YARD
MARE ISLAND
STRAIT
26' DEEP
RODEO
Crockett
Tormey
Davis Pt
Lone Tree Pt
Pinole
Wilson Pt
Pinole Pt
SAN PABLO BAY
SOLANO
CONTRA COSTA
SONOMA
MARIN
CONTRA COSTA
CHANNEL
600 FT WIDE, 36 FT DEEP
8102206
8102205
8102204
8102035
8102020
122°20'
122°28'
PINOLE SHOAL CHANNEL
MAINTAINED TO 35 FEET DEEP
DEEPENING TO 36 FEET FOR NAVY REQUIREMENTS
LEGEND
DREDGING AREA
DISPOSAL SITE
DISPOSAL SITE
S.F. #10
38° 00' 28"N
122° 24' 55W
DREDGING SITE
SAMPLE LOCATION
AND DISPOSAL SITE
PINOLE SHOAL
DEEPENING FOR NAVY REQUIREMENTS
IN SAN PABLO BAY CALIFORNIA
SCALE IN FEET
5000
5000
10,000
15,000
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA

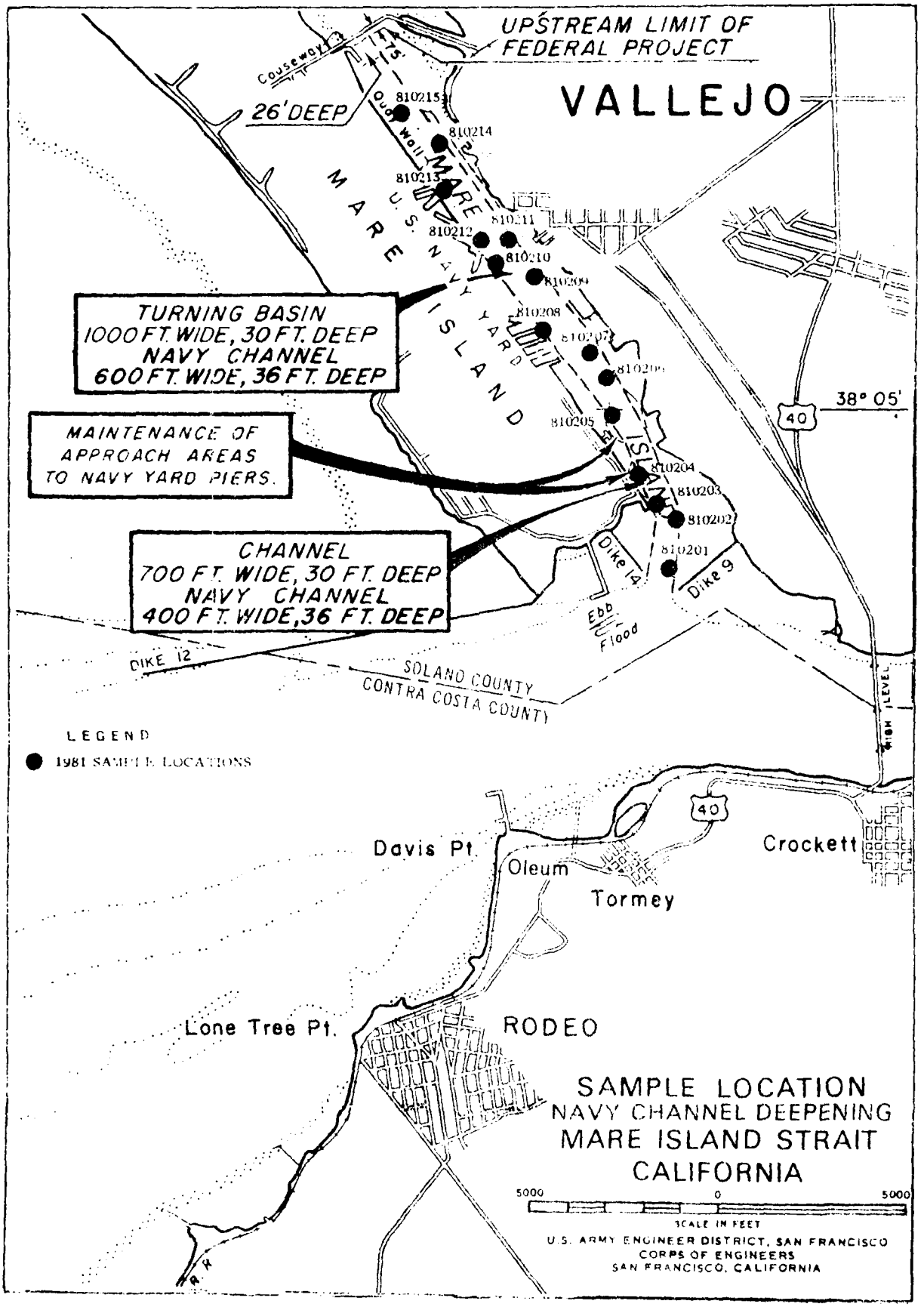

UPSTREAM LIMIT OF FEDERAL PROJECT
VALLEJO
Causeway
I-80
26' DEEP
810215
810214
810213
MARE ISLAND STRAIT
U.S. NAVY YARD
MARE ISLAND
810212
810211
810210
810209
810208
810207
810206
810205
810204
810203
810202
810201
TURNING BASIN
1000 FT. WIDE, 30 FT. DEEP
NAVY CHANNEL
600 FT. WIDE, 36 FT. DEEP
MAINTENANCE OF APPROACH AREAS TO NAVY YARD PIERS.
CHANNEL
700 FT. WIDE, 30 FT. DEEP
NAVY CHANNEL
400 FT. WIDE, 36 FT. DEEP
38° 05'
40
Dike 14
Dike 9
Dike 12
Ebb
Flood
SOLANO COUNTY
CONTRA COSTA COUNTY
HIGH LEVEL
LEGEND
1981 SAMPLE LOCATIONS
Davis Pt.
Oleum
Tormey
Crockett
Lone Tree Pt.
RODEO
SAMPLE LOCATION
NAVY CHANNEL DEEPENING
MARE ISLAND STRAIT
CALIFORNIA
5000
0
5000
SCALE IN FEET
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA

TABLE 1

STANDARD ELUTRIATE ANALYSIS

PINOLE SHOAL

Field No. Lab No.		PS 810201 PC-810068	PS 810202 PC-810069	PS 810203 PC-810070	PS 810204 PC-810071	PS 810205 PC-810072	PS 810206 PC-810073
Oil and Grease	mg/l	1-*	-	1-	1-	1-	1-
Residual Petroleum Hydrocarbons	"	0.2-	-	0.2-	0.2-	0.2-	0.2-
Hg	"	0.0006	-	0.0004	0.0002-	0.0002	0.0003
Cd	"	0.0011	-	0.0019	0.0005-	0.0005-	0.0010
Pb	"	0.005-	-	0.005-	0.005-	0.005-	0.005-
Cu	"	0.004	-	0.002	0.005	0.004	0.005
Zn	"	0.011	-	0.008	0.005	0.004	0.011
PCB	ug/l	0.022	-	0.022	0.023	0.023	0.020
TICH	"	0.0001-	-	0.0001	0.0001-	0.0001-	0.0001-
In Situ Density	g/l	1760	1970	1520	1500	1510	1950
Absolute Density	"	2750	2760	2730	2740	2740	2740

Field No. Lab No.		SP DIS810201 PC-810077	SP DS810202 PC-810078	SP DS810203 PC-810079	PS DR810201 PC-810074	PS DR810202 PC-810075
Oil and Grease	mg/l	1-	1-	1-	-	-
Residual Petroleum Hydrocarbons	"	0.2-	0.2-	0.2-	-	-
Hg	"	0.0004	0.0003	0.0002	-	-
Cd	"	0.0005-	0.0005-	0.0005-	-	-
Pb	"	0.005-	0.005-	0.005-	-	-
Cu	"	0.006	0.005	0.006	-	-
Zn	"	0.051	0.041	0.040	-	-
PCB	ug/l	0.040	0.062	0.045	-	-
TICH	"	0.0003	0.0002	0.005	-	-
Water Density	g/l	-	-	-	1011	1011

* The "-" following a number indicates the test detection limit.

TABLE 2

STANDARD ELUTRIATE ANALYSIS

MARE ISLAND

Field No. / Lab No.		MIS 810201 PC-810044	MIS 810202 PC-810045	MIS 810203 PC-810046	MIS 810204 PC-810047	MIS 810205 PC-810048	MIS 810206 PC-810049
Oil and Grease	mg/l	1-*	1-	1-	1-	1-	1-
Residual Petroleum Hydrocarbons	"	0.2-	0.2-	0.2-	0.2-	0.2-	0.2-
Hg	"	0.0005	0.0002	0.0006	0.0003	0.0008	0.0006
Cd	"	0.0006	0.0005-	0.0008	0.0005-	0.0012	0.0007
Pb	"	0.005-	0.005-	0.005-	0.005-	0.005-	0.005-
Cu	"	0.001	0.002	0.002	0.003	0.004	0.005
Zn	"	0.006	0.004	0.003	0.008	0.010	0.010
PCB	ug/l	0.132	0.290	0.255	0.176	0.408	0.223
TICH	"	0.0002	0.0007	0.0001-	0.0001-	0.0001-	0.0003-
In Situ Density	g/l	1360	1390	1350	1380	1240	1250
Absolute Density	"	2710	2720	2720	2720	2730	2710

Field No. / Lab No.		MIS 810207 PC-810050	MIS 810208 PC-810051	MIS 810209 PC-810052	MIS 810210 PC-810053	MIS 810211 PC-810054	MIS 810212 PC-810055
Oil and Grease	mg/l	1-	1-	1-	1-	1-	1-
Residual Petroleum Hydrocarbons	"	0.2-	0.2-	0.2-	0.2-	0.2-	0.2-
Hg	"	0.0002	0.0002	0.0003	0.0003	0.0003	0.0002
Cd	"	0.0006	0.0005-	0.0005-	0.0005-	0.0006	0.0005-
Pb	"	0.005-	0.005-	0.005-	0.005-	0.005-	0.005-
Cu	"	0.002	0.004	0.005	0.004	0.004	0.005
Zn	"	0.008	0.007	0.008	0.012	0.008	0.008
PCB	ug/l	0.198	0.204	0.175	0.266	0.236	0.182
TICH	"	0.0001-	0.0009	0.0001-	0.0003	0.0001	0.0003
In Situ Density	g/l	1360	1330	1300	1490	1230	1240
Absolute Density	"	2720	2710	2720	2680	2690	2730

* The "-" following a number indicates the test detection limit.

TABLE 2 (Continued)

STANDARD ELUTRIATE ANALYSIS

MARE ISLAND

Field No. Lab No.		MIS 810213 PC-810056	MIS 810214 PC-810057	MIS 810215 PC-810058	CAR DIS810201 PC-810060	CAR DIS810202 PC-810061	CAR DIS810203 PC-810062
Oil and Grease	mg/l	1-	1-	1-	1-	1-	1-
Residual Petroleum Hydrocarbons	"	0.2-	0.2-	0.2-	0.2-	0.2-	0.2-
Hg	"	0.0003	0.0002	0.0004	0.0003	0.0002	0.0005
Cd	"	0.0011	0.0006	0.0005-	0.0012	0.0008	0.0008
Pb	"	0.005-	0.005-	0.005-	0.005-	0.005-	0.005-
Cu	"	0.004	0.005	0.004	0.005	0.004	0.006
Zn	"	0.010	0.013	0.007	0.042	0.037	0.038
PCB	ug/l	0.203	0.143	0.142	0.112	0.102	0.103
TICH	"	0.0004	0.0001	0.0003	0.0002	0.0004	0.0002
In Situ Density	g/l	1330	1250	1280	-	-	-
Absolute Density	"	2720	2710	2710	-	-	-

Field No. Lab No.		CAR DIS810204 PC-810063	CAR DIS810205 PC-810064	CAR DIS810206 PC-810065	MIS DR810201 PC-810066	MIS DR810202 PC-810067
Oil and Grease	mg/l	1-	1-	1-	-	-
Residual Petroleum Hydrocarbons	"	0.2-	0.2-	0.2-	-	-
Hg	"	0.0002	0.0003	0.0004	-	-
Cd	"	0.0010	0.0005-	0.0019	-	-
Pb	"	0.005-	0.005-	0.005-	-	-
Cu	"	0.004	0.008	0.006	-	-
Zn	"	0.042	0.042	0.049	-	-
PCB	ug/l	0.101	0.074	0.107	-	-
TICH	"	0.003	0.0002	0.0003	-	-
Water Density	"	-	-	-	1005	1005

TABLE 3

PINOLE SHOAL

SUMMARY OF RESULTS OF ELUTRIATE AND

DISPOSAL SITE WATER CHEMICAL ANALYSIS

(mg/ℓ)

CONTAMINANT OF CONCERN	PINOLE SHOAL ELUTRIATE mean value all stations	SAN PABLO BAY DISPOSAL SITE mean value all stations	STATE WATER CRITERIA
OIL & GREASE	1 -*	1 -	75.0
RESIDUAL PETROLEUM HYDROCARBONS	0.2 -	0.2 -	-
MERCURY (Hg)	0.0003	0.0003	0.0014
CADMIUM (Cd)	0.001	0.0005	0.03
LEAD (Pb)	0.005 -	0.005 -	0.08
COPPER (Cu)	0.004	0.006	0.05
ZINC (Zn)	0.006	0.044	0.2
PCB (ug/ℓ)	0.022	0.049	-
TICH (ug/ℓ)	0.0001 -	0.049	-
PCB + TICH (ug/ℓ)	0.0221	0.098	6.0

* The "-" indicates the test detection limit.

TABLE 4

MARE ISLAND

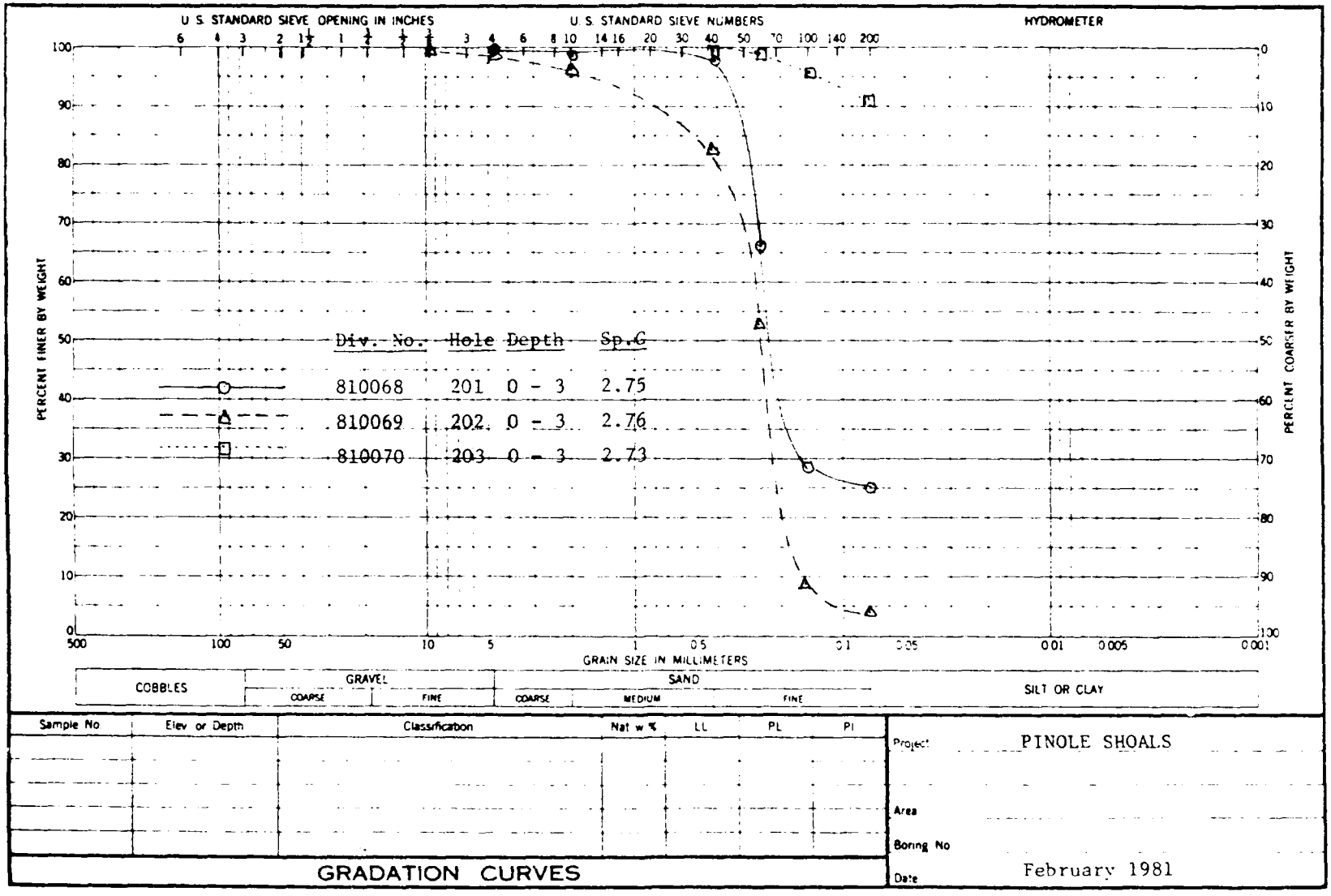
SUMMARY OF RESULTS OF ELUTRIATE

and DISPOSAL SITE WATER CHEMICAL ANALYSIS

(mg/ℓ)

CONTAMINANT OF CONCERN	MARE ISLAND ELUTRIATE mean value all stations	CARQUINEZ DISPOSAL SITE mean value all stations	STATE WATER CRITERIA
OIL & GREASE	1 -*	1 -	75.0
RESIDUAL PETROLEUM HYDROCARBONS	0.2 -	0.2 -	-
MERCURY (Hg)	0.0003	0.0004	0.0014
CADMIUM (Cd)	0.0007	0.0012	0.03
LEAD (Pb)	0.0005 -	0.0005 -	0.08
COPPER (Cu)	0.004	0.007	0.05
ZINC (Zn)	0.008	0.05	0.2
PCB (ug/ℓ)	0.215	0.120	-
TICH (ug/ℓ)	0.0003	0.0009	-
PCB + TICH (ug/ℓ)	0.2153	0.1209	6.0

* The "-" indicates the test detection limit.



Sample No	Elev or Depth	Classification	Nat w %	LL	PL	PI

GRADATION CURVES

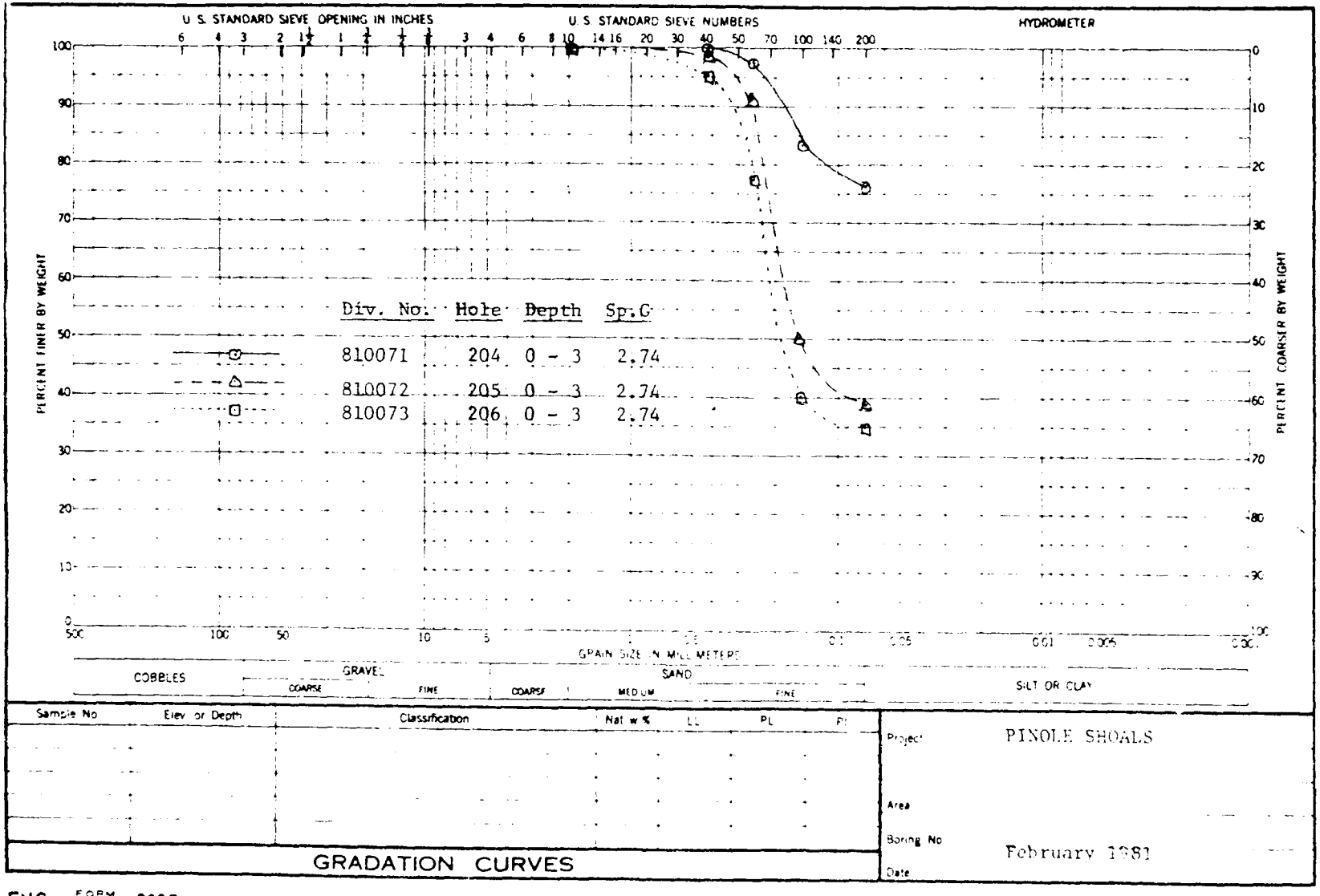
Project: PINOLE SHOALS

Area

Boring No

Date: February 1981

ENG FORM 1 MAY 63 2087



ENG FORM MAY 63 2087

CORPS OF ENGINEERS — U.S. ARMY ENGINEER DIVISION, SOUTH PACIFIC — U.S. ARMY

SOIL TEST RESULT SUMMARY

PROJECT [illegible] ARMY — DATE February 1971

DIVISION SERIAL NO	HOLE NO	COORD OR STA	FIELD SAMPLE NO	DEPTH OR ELEVATION FROM	TO	LABORATORY DESCRIPTIVE CLASSIFICATION	MECHANICAL ANALYSIS % FINER THAN GRAVEL	SAND	SILT	CLAY	LIQUID LIMIT	PLASTICITY INDEX	SPECIFIC GRAVITY +4	-4	FIELD DRY WT. LB/C.F.	MOIST %	RESULTS ON SEPARATE FORMS CONSOLIDATION UNDISTURBED	REMOLDED	CONSOLIDATION AA AND BB	CBR SWELL	CBR PENETRATION	PERMEABILITY
810044	201			0	6			100	99	[illegible]				2.71							
810045	202			0	6				100	99				[illegible]							
810046	203			0	6				100	99				2.72							
810047	204			0	6				100	99				[illegible]							
810048	205			0	6				100					2.72							
810049	206			0	6				100					2.71							
810050	207			0	6				100					2.72							
810051	208			0	6				100	99				2.71							
810052	209			0	6				100					2.72							
810053	210			0	6				100					2.68							
810054	211			0	6				100					2.69							
810055	212			0	6				100					2.71							
810056	213			0	6				100	99				2.72							
810057	214			0	6				100	99				2.71							
810058	215			0	6				100					2.71							

PLATE

DD Form 15 JULY 1957 **66** (CIVIL) (Edition of 7 July 1956 is obsolete)

APPENDIX D
FISH AND WILDLIFE

TABLE 1
FISHES OF THE STUDY AREA

SCIENTIFIC NAME	COMMON NAME	Resident Year Round	Winter Residents	Spring Migrants	Spawners	Juveniles	Adults	Eggs	Larvae	Benthic Organisms	Detritus	Plankton	Fish	Mammals
CLASS AGNATHA: JAWLESS FISHES														
ORDER PETROMYZONTIFORMES: LAMPREYS														
FAMILY PETROMYZONTIDAE: LAMPREYS														
[illegible]	Pacific Lamprey				X			X						
[illegible]	River Lamprey													
CLASS CHONDRICHTHYS: CARTILAGINOUS FISHES														
ORDER HEXANCHIFORMES: COW SHARKS														
ORDER SQUALIFORMES: TYPICAL SHARKS														
FAMILY CARCHARHINIDAE: REQUIEM SHARKS														
[illegible]	Grey Smoothhound	X					X			X				X
[illegible]	Brown Smoothhound	X					X			X				X
FAMILY SQUALIDAE: DOGFISHES														
[illegible]	Spiny Dogfish	X					X			X				X
ORDER RAJIFORMES: SKATES AND RAYS														
FAMILY RAJIDAE: SKATES														
[illegible]	Big Skate	X					X			X				
FAMILY MYLIOBATIDAE: RAYS														
[illegible]	Bat Ray	X						X		X				
CLASS OSTEICHTHYS: BONY FISHES														
ORDER ACIPENSERIFORMES: STURGEONS AND PADDLEFISHES														
FAMILY ACIPENSERIDAE: STURGEONS														
[illegible]	Green Sturgeon				X		X			X	X			
[illegible]	White Sturgeon				X		X				X			
ORDER CLUPEIFORMES: HERRINGS AND ANCHOVIES														
FAMILY CLUPEIDAE: HERRINGS														
[illegible]	American Shad				X		X					X		
[illegible]	Pacific Herring			X				X				X		
[illegible]	Threadfin Shad				X		X					X		
FAMILY ENGRAULIDAE: ANCHOVIES														
[illegible]	Northern Anchovy			X		X						X		
ORDER SALMONIFORMES:														
FAMILY SALMONIDAE: TROUTS AND SALMON														
[illegible]	King Salmon				X		X			X				
[illegible]	Steelhead				X		X			X				

C = Commercial value

S = Sport value

FISHES OF THE STUDY AREA (continued)

		Resident Near Bottom	Winter Resident	Summer Resident	Transient	Abundant	Common	Casual	Rare	Benthic Carnivore	Pelagic Herbivore	Piscivorous	Planktivore	Introduced
	Whitebait Smelt		X					X				X		
S	Surf Smelt		X					X				X		
	Night Smelt		X					X				X		
	Longfin Smelt		X					X				X		
	Goldfish	X							X	X				
C	Carp	X							X	X				
	Goldfish	X							X	X				
	Pacific Herring		X					X		X				
	Pacific Hake		X					X		X				
	Topsmelt	X					X					X		
	Jacksmelt	X					X					X		
	Threespine Stickleback	X							X	X	X			
	Bay Pipefish	X						X		X				
	Diamond	X							X	X				
	Striped Bass	X					X			X	X			
	White Croaker		X					X		X				
	Barred Surfperch			X					X	X				X
	Shiner Surfperch	X					X			X				X
	Black Surfperch			X				X		X				X
	Striped Seaperch			X					X	X				X

C = Commercial value

S = Sport value

SCIENTIFIC NAME	COMMON NAME	Year-Round Resident	Winter Resident	Summer Resident	Transient	Accidental	Carnivore	Omnivore	Detritus Consumer	Benthic Herbivore	Planktivore	Carnivorous Zooplankton (Larvae)
C S [illegible]	Walleye Surfperch			X				X		X		X
C S [illegible]	Rainbow Surfperch			X					X	X		X
[illegible]	Dwarf Surfperch	X					X				X	X
C S [illegible]	White Surfperch							X		X		
C S [illegible]	Rubberlip Surfperch			X				X		X	X	
S [illegible]	Pile Surfperch							X		X		X
	FAMILY GOBIIDAE: GOBIES											
[illegible]	Yellowfin Goby	X					X			X		X
[illegible]	Tidewater Goby	X						X		X		
[illegible]	Bay Goby	X					X			X		
	FAMILY STICHAEIDAE: PRICKLEBACKS											
S [illegible]	Brown Rockfish	X						X		X	X	
	FAMILY HEXAGRAMMIDAE: GREENLINGS											
C S [illegible]	Lingcod	X							X	X	X	
	FAMILY COTTIDAE: SCULPINS											
[illegible]	Woodhead Sculpin	X						X		X		X
[illegible]	Pacific Staghorn Sculpin	X					X			X		
	FAMILY AGONIDAE: POACHES											
[illegible]	Pigmy Poacher	X							X	X		
[illegible]	Prickleback Poachers	X							X			
	FAMILY CYCLOPTERIDAE: LUMPFISHES AND SNAILFISHES											
[illegible]	Showy Snailfish	X							X	X		
	ORDER PLEURONECTIFORMES: FLOUNDERS, SOLES, AND TONGUEFISHES											
	FAMILY BOTHIDAE: FLATFISHES											
C [illegible]	Pacific Sanddab	X					X			X		
[illegible]	California Halibut	X					X			X		
	FAMILY PLEURONECTIDAE: FLATFISHES											
C [illegible]	Diamond Turbot	X						X		X		
[illegible]	Slender Sole	X						X		X		
C [illegible]	English Sole	X					X			X		
C [illegible]	Starry Flounder	X					X			X		
C [illegible]	Hornyhead Turbot	X						X		X		
C [illegible]	Sand Sole	X						X		X		
	FAMILY CYNOGLOSSIDAE: FLATTAILS											
[illegible]	California Tonguefish	X						X		X		
	ORDER COBITIDIFORMES: LOACHFISHES											

C = Commercial Value

S = Sport Value

FISHES OF THE STUDY AREA (continued)

SCIENTIFIC NAME	COMMON NAME	Resident Year Round	Winter Resident	Summer Resident	Transient	Abundant	Common	Casual	Rare	Benthic Carnivore	Benthic Herbivore	Piscivorous	Planktivorous	Browser
ORDER SCORPAENIFORMES: SCULPINS														
FAMILY COTTIDAE: SCULPINS														
[illegible]	Fourhorn Sculpin	X						X		X				
ORDER PERCIFORMES: PERCHES														
FAMILY EMBIOTOCIDAE: SURFPERCH														
[illegible]	White Surfperch	X							X	X				

[illegible] Commercial value

[illegible] Sport value

TAKEN FROM REF. NAVY, 1974.

TABLE 2

OBSERVED AND EXPECTED FAUNA OF
MARE ISLAND VICINITY, VALLEJO, CALIFORNIA

Amphibians	
Order Caudata	
Ambystoma tigrinum	Tiger Salamander
Batrachoseps attenuatus	California Slender Salamander
Order Anura	
Buto boreas	Western Toad
Hyla regilla	Pacific Treefrog
Reptiles	
Order Squamata	
Gerrhonotus multicarinatus	Southern Alligator Lizard
Sceloporus occidentalis	Western Fence Lizard
Coluber constricter	Western Yellow-Bellied Racer
Pituophis melanoleucus	Gopher Snake
Lampropeltis getulus	Common Kingsnake
Mammals	
Order Insectivora	
Sorex sinuosus	Suisun Shrew
Sorex ornatus	Ornate Shrew
Scapanus latimanus	Broad-Handed Mole
Order Chiroptera	
Myotis californicus	California Myotis
Antrozous pallidus	Pallid Bat
Tadarida brasiliensis	Brazilian Free-Tailed Bat
Plecotus townsendii	Lump-Nosed Bat
Order Lagomorpha	
*Lepus californicus**	Black-Tailed Hare
Order Rodentia	
Otospermophilus beecheyi	California Ground Squirrel
Thomomys bottae	Botta Pocket Gopher
Reithrodontomys megalotis	Western Harvest Mouse
Peromyscus maiculatus	Deer Mouse
*Microtus californicus**	California Meadow Mouse
*Ondatra zibetheca**	Muskrat

* Indicates those species observed in the general area.

SOURCE: CITY OF VALLEJO, 1976.

Order Carnivora	
*Procyon lotor**	Raccoon
Mustela vison	Mink
Mustela frenata	Long-Tailed Weasel
*Mephitis mephitis**	Striped Skunk
Order Artiodactyla	
Odocoileus hemionus	Mule Deer
Birds	
Order Falconiformes	
*Cathartes aura**	Turkey Vulture
*Circus cyaneus**	Marsh Hawk
*Buteo jamaicensis**	Red-Tailed Hawk
*Elanus leucurus**	White-Tailed Kite
*Falco sparverius**	American Kestrel
Order Ciconiiformes	
Nycticorax nycticorax	Black-Crowned Night Heron
Order Charadriiformes	
*Charadrius vociferus**	Killdeer
Order Columbiformes	
Columba livia	Rock Dove
Order Strigiformes	
Otus asio	Screech Owl
Asio flammeus	Short-Eared Owl
Speotyto cunicularia	Burrowing Owl
Order Apodiformes	
Calypte anna	Anna's Hummingbird
Selasphorous sasin	Allen's Hummingbird
Order Passeriformes	
Sayornis nigricans	Black Phoebe
Sayornis saya	Say's Phoebe
Stelgidopteryx ruficollis	Rough-Winged Swallow
Hirundo rustica	Barn Swallow
Aphelocoma coerulescens	Scrub Jay
*Coryus brachyrhynchos**	Common Crow
*Mimus polyglottos**	Mockingbird
Telmatodytes palustris	Long-Billed Marsh Wren
Anthus spinoletta	Water Pipet
Lanius ludovicianus	Loggerhead Shrike
Sturnus vulgaris	Starling
*Passer domesticus**	House Sparrow
*Sturnella neglecta**	Western Meadowlark
*Agelaius phoeniceus**	Red-Winged Blackbird

* Indicates those species observed in the general area.

SOURCE: CITY OF VALLEJO, 1976.

*Euphagus cyanocephalus**	Brewer's Blackbird
Carpodacus mexicanus	House Finch
Spinus tristis	American Goldfinch
Spinus psaltria	Lesser Goldfinch
Melospiza melodia	Song Sparrow

* Indicates those species observed in the general area.

SOURCE: CITY OF VALLEJO, 1976.

BENTHIC ANIMAL MASTER LIST

PHYLUM PROTOZOA
- Subphylum Ciliophora
  - Class Ciliata
    - Subclass Euciliata
      - Order Peritricha
        - Family Vorticellidae
          - Vorticella sp.
- Subphylum Plasmodroma
  - Class Sarcodina
    - Subclass Rhizopoda
      - Order Foraminifera
        - Unidentified species

PHYLUM PORIFERA
- Unidentified species
  - Class Demospongiae
    - Unidentified species
      - Order Keratosa
        - Unidentified species
  - Class Hexactinellida
    - Unidentified species

PHYLUM CNIDARIA (=COELENTERATA)
- Unidentified species
  - Class Anthozoa
    - Subclass Alcyonaria (=Octocorallia)
      - Order Pennatulacea
        - Unidentified species
          - Family Stylatulidae
            - Stylatula elongata (Gabb, 1863)
    - Subclass Zoantharia (=Hexacorallia)
      - Order Actinaria
        - Diadumene sp.
        - Haliplanella sp.

SOURCE: APPENDIX D, DREDGE DISPOSAL STUDY, 1975.

Benthic Animal Master List

PHYLUM CNIDARIA (=COELENTERATA) (Continued)
- Class Hydrozoa
  - Unidentified species
  - Order Hydroida
    - Suborder Calyptoblastea
      - Unidentified species
      - Family Campanularidae
        - *Campanularia* sp.
        - *Gonothyraea* sp.
      - Family Plumulariidae
        - *Plumularia* sp.
      - Family Sertulariidae
        - *Sertularia* sp.
    - Suborder Gymnoblastea
      - Family Bimeriidae
        - *Bimeria* sp.
      - Family Syncorynidae
        - *Syncoryne* sp.

PHYLUM PLATYHELMINTHES
- Unidentified species
- Class Turbellaria
  - Order ?Acoela
    - Unidentified species

PHYLUM NEMERTEA
- Unidentified species

PHYLUM NEMATODA
- Unidentified species

PHYLUM SIPUNCULA (=SIPUNCULOIDEA)
- *Sipunculus* sp.
- Unidentified species

PHYLUM ANNELIDA
- Class Oligochaeta
  - Unidentified species

PHYLUM ANNELIDA (Continued)
Class Polychaeta
Unidentified species
Family Dorvilleidae
Schistomeringos longicornis Jumars, 1974
Schistomeringos sp.
Unidentified species
Family Eunicidae
Lysidice ninetta Audouin and Milne Edwards, 1833
Marphysa sanguinea (Montagu, 1815)
Unidentified species
Family Hesionidae
Gyptis brevipalpa Hartmann-Schroeder, 1959
Hesionella mccullochae Hartman, 1939
Microphthalmus sp.
Ophiodromus pugettensis (Johnson, 1901)
Unidentified species
Family Glyceridae
Glycera americana Leidy, 1855
Glycera oxycephala Ehlers, 1887
Glycera sp., near *robusta* Ehlers, 1868
Glycera tenuis Hartman, 1944
Glycera sp.
Family Goniadidae
Glycinde sp.
Family Nereidae
Neanthes succinea (Frey and Leuckart, 1849)
Neanthes sp.
Nereis latenscens Chanberlin, 1919
Unidentified species
Family Nephtyidae
Nephtys caecoides Hartman, 1938
Nephtys cornuta franciscana Clark and Jones, 1955
Nephtys parva Clark and Jones, 1955

PHYLUM ANNELIDA (Continued)

Family Phyllodocidae

- Anaitides williamsi Hartman, 1936
- Anaitides sp.
- Eteone dilatae Hartman, 1936
- Eteone lighti Hartman, 1936
- Eteone longa californica Hartman, 1936
- Eulalia aviculiseta Hartman, 1936
- Eumida bifoliata (Moore, 1909)
- near Eumida sanguinea (Oersted, 1843)
- Eumida sp.
- Hesionura sp.
- Promystides sp.
- Unidentified species

Family Polynoidae

- Harmothoe imbricata (Linnaeus, 1767)
- Harmothoe sp.
- Unidentified species

Family Sigalionidae

- Pholoe minuta (Fabricius, 1780)
- Sthenelanella uniformis Moore, 1910

Family Syllidae

- Autolytus sp.
- Exogone lourei Berkeley and Berkeley, 1938
- Exogone sp.
- Langerhansia sp.
- Odontosyllis parva Berkeley, 1923
- Sphaerosyllis sp.
- Streptosyllis sp.
- Syllides sp.
- Unidentified species

Family Capitellidae

- Capitella capitata (Fabricius, 1780)
- Capitella sp.
- Capitita ambiseta Hartman, 1947
- Decamastus sp.
- Heteromastus filiformis (Claparède, 1864)
- Heteromastus sp.
- Mediomastus californiensis Hartman, 1944
- Notomastus (Clistomastus) tennuis Moore, 1909
- Unidentified species

Family Cirratulidae
- Caulleriella hamata (Hartman, 1948)
- Chaetozone sp.
- Cirratulus cirratus (O. F. Müller, 1776)
- Cirriformia spirabrancha (Moore, 1904)
- Tharyx parvus Berkeley, 1929
- Tharyx sp., cf monilaris Hartman, 1960
- Tharyx sp.
- Unidentified species

Family Cossuridae
- Cossura pygodactylata Jones, 1956

Family Maldanidae
- Asychis sp.

Family Opheliidae
- Armandia brevis (Moore, 1906)

Family Orbiniidae
- Haploscoloplos pugettensis (Pettibone, 1957)
- Unidentified species

Family Oweniidae
- Myriochele sp., near gracilis Hartman, 1955

Family Pectinariidae
- Pectinaria californiensis Hartman, 1941

Family Spionidae
- Boccardia truncata Hartman, 1936
- Polydora brachycephala Hartman, 1936 = P. caulleryi (Mesnil, 1897)
- Polydora caeca Oersted, 1843
- Polydora ligni Webster, 1879
- Polydora socialis Schmarda, 1861
- Polydora sp.
- Prionospio cirrifera Wirén, 1883
- Prionospio sp.
- Pseudopolydora kempi californica Light, 1969
- Pseudopolydora paucibranchiata (Okuda, 1937)
- Pseudopolydora sp.
- Pygospio sp.
- Scoletepis squamata (Mueller, 1806)
- Spiophanes bombyx (Claparède, 1870)
- Spiophanes fimbriata Moore, 1923
- Spiophanes missionensis Hartman, 1941

PHYLUM ANNELIDA (Continued)
- Spiophanes sp.
- Streblospio benedicti Webster, 1879
- Unidentified species

Family Trochochaetidae
- Disoma multisetosum Oersted, 1844
- Trochochaeta multisetosum Oersted, 1843

Family Terebellidae
- Polycirrus californicus Moore, 1909
- Polycirrus sp., near tenuisetis Langerhans, 1880
- Polycirrus sp.
- Unidentified species

Family Lumbrineridae
- Lumbrineris tetraura (Schmarda, 1861)
- Lumbrineris sp.

Family Ampharetidae
- Melinnampharete gracilis Hartman, 1969
- Unidentified species

Family Sabellidae
- Chone gracilis Moore, 1906
- Chone mellis (Bush, 1904)
- Chone minuta Hartman, 1944
- Euchone limnicola Reish, 1959
- Unidentified species

Family Chrysopetalidae
- Paleanotus bellis (Johnson, 1897)
- ?Paleanotus sp.

Family Pilargiidae
- Pilargis sp.

ARCHIANNELIDA
- Unidentified species

PHYLUM ARTHROPODA

Subphylum Mandibulata

Class Crustacea

Subclass Ostracoda
- Sarsiella zostericola Cushman, 1906
- Sarsiella sp.
- Unidentified species

PHYLUM ARTHROPODA (Continued)
- Subclass Copepoda
  - Unidentified species
- Subclass Cirripedia
  - Unidentified species
    - Order Thoracica
      - Suborder Balanomorpha
        - Family Balanidae
          - *Balanus cariosus* (Pallas, 1788)
          - *Balanus crenatus* Bruguière, 1789
          - *Balanus improvisus* Darwin, 1854
          - *Balanus* sp., cf *amphitrite* Darwin, 1854
          - *Balanus* sp.
- Subclass Malacostraca
  - Division Peracarida
    - Order Mysidacea
      - Unidentified species
    - Order Cumacea
      - *Cumella vulgaris* Hart, 1930
      - *Diastylopsis* sp.
      - *Eudorella pacifica* Hart, 1930
      - *Eudorella* sp.
      - *Lamprops* sp. cf *quadriplicata* Smith, 1879
      - Unidentified species
    - Order Tanaidacea
      - Suborder Dikonophora
        - Family Paratanaidae
          - *Leptochelia dubia* (Krøyer, 1842)
    - Order Isopoda
      - Unidentified species
        - Suborder Valvifera
          - Family Idoteidae
            - *Synidotea bicuspida* (Owen, 1839)
            - *Synidotea harfordi* Benedict, 1897
            - *Synidotea laticauda* Benedict, 1897
            - *Synidotea* sp.
        - Suborder Anthuridea
          - Family Anthuridae
            - Unidentified species

PHYLUM ARTHROPODA (Continued)

- Suborder Flabellifera
  - Family Limnoriidae
    - *Limnoria quadripunctata* Holthuis, 1949
- Suborder Asellota
  - Unidentified species

Order Amphipoda

- Unidentified species
- Suborder Gammaridea
  - Family Ampeliscidae
    - *Ampelisca milleri* Barnard, 1954
  - Family Corophiidae
    - *Corophium acherusicum* Costa, 1857
    - *Corophium insidiosum* Crawford, 1937
    - *Corophium* sp.
    - *Grandidierella japonica* Stephensen, 1938
    - *Photis brevipes* Shoemaker, 1942
    - *Photis californica* Stout, 1913
    - *Photis* sp.
    - *Protomedeia zotea* Barnard, 1962
    - *Protomedeia* sp.
  - Family Gammaridae
    - *Melita dentata* (Krøyer, 1842)
    - *Melita* sp., cf *sulca* (Stout, 1913)
    - *Melita* sp.
    - Unidentified species
  - Family Ischyroceridae
    - *Ischyrocerus anguipes* Krøyer, 1838
    - *Ischyrocerus* sp.
  - Family Phoxocephalidae
    - *Paraphoxus milleri* (Thorsteinson, 1941)
  - Family Pleustidae
    - *Parapleustes pugettensis* (Dana, 1853)
    - *Parapleustes* sp.
  - Family Podoceridae
    - *Dulichia* sp.
    - *Podocerus* sp.
  - Family Stenothoidae
    - *Stenothoides* sp.
  - Family Synopiidae
    - *Tiron biocellata* Barnard, 1962

PHYLUM ARTHROPODA (Continued)
Suborder Caprellidea
Unidentified species
Family Aeginellidae
Caprella sp.
Unidentified species
Suborder Hyperiidea
Unidentified species
Order Decapoda
Unidentified species
Suborder Reptantia
Section Brachyura
Unidentified species
Family Majidae
Pyromaia tuberculate (Lockington, 1877)
Family Cancridae
Cancer antennarius Stimpson, 1856
Cancer jordani Rathbun, 1900
Unidentified species
Family Xanthidae
Rithropanopeus harrisii (Gould, 1841)
Family Pinnotheridae
Pinnixa franciscana Rathbun, 1918
Family Grapsidae
Hemigrapsus oregonensis (Dana, 1851)
Section Anomura
Unidentified species
Family Callianassidae
Callianassa californiensis Dana, 1854
Upogebia pugettensis (Dana, 1852)
Upogebia sp.
Section Carides
Family Crangonidae
Crangon sp.

Benthic Animal Master List

PHYLUM ARTHROPODA (Continued)
- Subphylum Chelicerate
  - Class Pycnogonida
    - Unidentified species
      - Family Ammothecidae
        - Lecythorhynchus marginatus Cole, 1904
  - Class Arachnida
    - Unidentified species
      - Order Acarina
        - Unidentified species
        - Hydracarina--Unidentified species
  - Class Insecta
    - Unidentified species
  - Class Acari
    - Order Trombidiformes
      - Family Halacaridae
        - Unidentified species

PHYLUM MOLLUSCA
- Class Gastropoda
  - *Subclass Prosobranchia*
    - Order Mesogastropoda
      - Family Rissoidae
        - Alvinia californica (Bartsch, 1911)
        - Alvinia compacta (Carpenter, 1864)
      - Family Caecidae
        - Fartulum sp.
      - Family Epitoniidae
        - Epitonium tinctum (Carpenter, 1864)
      - Family Calyptraeidae
        - Crepidula convexa Say, 1822
        - Crepidula plana Say, 1822
    - Order Neogastropoda
      - Family Muricidae
        - Urosalpinx cinerea (Say, 1822)
      - Family Melongenidae
        - Busycon canaliculatum (Linnaeus, 1758)
      - Family Nassariidae
        - Nassarius mendicus (Gould, 1850)
        - Nassarius obsoletus (Say, 1822)

PHYLUM MOLLUSCA (Continued)
- Subclass Opisthobranchia
  - Order Pyramidellida
    - Family Pyramidellidae
      - Iselica ovoidea (Gould, 1853)
      - Odostomia (Evalea) cf. O. deliciosa Dall & Bartsch, 1907
      - Odostomia (Evalea) franciscana Bartsch, 1917
      - Odostomia (Evalea) tenuisculpta Carpenter, 1864
      - Odostomia (Evalea) valdezi Dall & Bartsch, 1907
      - Odostomia (Menestho) fetella Dall & Bartsch, 1909
      - Odostomia (Evalea) sp.
  - Order Nudibranchia
    - Unidentified species
- Class Bivalvia (Pelecypoda)
  - Unidentified species
  - Subclass Pteriomorphia
    - Order Mytiloida
      - Family Mytilidae
        - Adula diegensis (Dall, 1911)
        - Modiolus sp.
        - Musculus senhousia (Benson, 1842)
        - Mytilus edulis Linnaeus, 1758
    - Order Pterioida
      - Family Ostreidae
        - Ostrea lurida Carpenter, 1864
      - Family Anomiidae
        - Pododesmus sp.
  - Subclass Heterodonta
    - Order Veneroida
      - Family Montacutidae
        - Mysella ferruginosa (Dall, 1916)
      - Family Veneridae
        - Gemma gemma (Totten, 1834)
        - Protothaca staminea (Contrad, 1837)
        - Tapes japonica Deshayes, 1853
        - Transennella tantilla (Gould, 1853)
      - Family Petricolidae
        - Petricola cf. P. carditoides (Contrad, 1837)

PHYLUM ECTOPROCTA (=BRYOZOA) (Continued)
- Family Schizoporellidae
  - Schizoporella sp.
- Family Smittinidae
  - Parasmittina trispinosa (Johnston, 1838)
  - Smittoidea prolifica Osburn, 1952
- Family Schizoporellidae
  - Schizoporella sp.

Order Ctenostomata
- Family Vesiculariidae
  - Bowerbankia gracilis Leidy, 1855
- Family Alcyoniidae
  - Alcyonidium parasiticum (Fleming, 1828)
  - Alcyonidium polyoum (Hassall, 1841)

Order Cyclostomata
- Unidentified species
- Family Crisiidae
  - Crisia maxima Robertson, 1910
  - Crisia occidentalis Trask, 1857
  - Filicrisia geniculata (Milne-Edwards, 1838)
  - Filicrisia sp.

PHYLUM ENTOPROCTA
- Family Pedicellinidae
  - Barentsia sp.

PHYLUM PHORONIDA
- Phoronopsis viridis Hilton, 1930
- Phoronis sp.
- Unidentified species

PHYLUM ECHINODERMATA
- Class Holothuroidea
  - cf Leptosynapta sp.
  - Unidentified species
- Class Ophiuroidea
  - Ophionereis sp.

PHYLUM CHORDATA
- Subphylum Urochordata (=Tunicata)
  - Unidentified species
    - Class Ascidiacea
      - Unidentified species
        - Order Enterogona
          - Suborder Aplousobranchia
            - Amoroucium sp.
          - Suborder Phlebobranchia
            - Ciona intestinalis (Linnaeus, 1767)
        - Order Pleurogona
          - Suborder Stolidobranchia
            - Styela sp.

- Subphylum Vertebrata
  - Class Osteichthyes
    - Unidentified species

APPENDIX E

COMMENTS AND RESPONSES TO DRAFT ENVIRONMENTAL IMPACT STATEMENT

APPENDIX E

COMMENTS AND RESPONSES TO DRAFT ENVIRONMENTAL IMPACT STATEMENT

Advisory Council On Historic Preservation

This response does not constitute Council comment pursuant to Section 106 of the National Historic Preservation Act, nor Section 2(b) of Executive Order 11593.

1522 K Street, NW
Washington, DC 20005

Reply to:

Lake Plaza South, Suite 616
44 Union Boulevard
Lakewood, CO 80228

May 27, 1981

Colonel Paul Bazilwich, Jr.
District Engineer
Department of the Army
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, California 94105

Dear Colonel Bazilwich:

This is in response to your request of May 12, 1981, for comment on the draft environmental statement (DES) for the Pinole Shoal and Mare Island Strait dredging permit, California.

The Council has reviewed the DES and notes that the Corps has determined that the proposed undertaking will not affect properties included in or eligible for inclusion in the National Register of Historic Places. Accordingly, the Council has no further comment to make at this time. It is suggested, however, that the final environmental statement contain the California State Historic Preservation Officer's concurrence in the Corps' determination of no effect.

Should you have any questions or require additional information, please call Jane King at (303) 234-4946, an FTS number.

Sincerely,

Louis S. Wall
Chief, Western Division
of Project Review

RESPONSE TO COMMENT BY THE ADVISORY COUNCIL ON HISTORIC PRESERVATION (27 MAY 1981)

By letter dated 11 May 1981 the State Historic Preservation Officer concurred with the Corps' determination of no effect. (Reference Appendix B, Document B-6, page B-22).

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON 20426

IN REPLY REFER TO:

May 22, 1981

Mr. Paul Bazliwich, Jr.
Colonel, CE
District Engineer
U. S. Dept. of the Army
211 Main Street
San Francisco, CA 94105

Dear Mr. Baker:

I am replying to your request of April 30, 1981 to the Federal Energy Regulatory Commission for comments on the Draft Environmental Impact Statement for the U. S. Navy Deepening of Pinole Shoal and Mare Isand Strait. This Draft EIS has been reviewed by appropriate FERC staff components upon whose evaluation this response is based.

This staff concentrates its review of other agencies' environmental impact statements basically on those areas of the electric power, natural gas, and oil pipeline industries for which the Commission has jurisdiction by law, or where staff has special expertise in evaluating environmental impacts involed with the proposed action. It does not appear that there would be any significant impacts in these areas of concern nor serious conflicts with this agency's responsibilities should this action be undertaken.

Thank you for the opportunity to review this statement.

Sincerely,

Jack M. Heinemann
Advisor on Environmental Quality

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
630 Sansome Street
San Francisco, California 94111

1950
May 4, 1981

Colonel Paul Bazilwich, Jr.
District Engineer
Department of the Army
San Francisco District, Corp of Engineers
211 Main Street
San Francisco, CA 94105

Dear Colonel Bazilwich:

Thank you for the opportunity to review the draft environmental impact statement for the U.S. Navy Deepening of Pinole Shoal and Mare Island Strait. National Forest System lands and resources are not involved and we therefore have no comment. Also, it will not be necessary to send us a copy of the final statement.

Sincerely,

ZANE G. SMITH, JR.
Regional Forester

6200-11 (1 69)

United States
Department of
Agriculture

Soil
Conservation
Service

2828 Chiles Road
Davis, CA 95616
(916) 758-2200

May 6, 1981

Colonel Paul Bazilwich, Jr.
District Engineer
U. S. Army, Corps of Engineers
211 Main Street
San Francisco, California 94105

Dear Colonel Bazilwich:

The Soil Conservation Service has reviewed the Draft Environmental Impact Statement for the proposed U. S. Navy Deepening of Pinole Shoal and Mare Island Strait. We feel the statement has adequately considered all items within the realm of the Service's expertise and responsibility.

No prime agricultural land will be affected by this proposed project.

We appreciate the opportunity to comment on this environmental statement.

Sincerely,

FRANCIS C. H. LUM
State Conservationist

cc: Norman A. Berg, Chief, SCS, Washington, D.C.

GENERAL COUNSEL OF THE
UNITED STATES DEPARTMENT OF COMMERCE
Washington, D C 20230

JUL 2 1981

Colonel Paul Bazilwich, Jr.
District Engineer
U.S. Army Engineer District, San Francisco
211 Main Street
San Francisco, California 94105

Dear Colonel Bazilwich:

This is in reference to your draft environmental impact statement entitled "U.S. Navy Deepening of Pinole Shoal and Mare Island Strait, Solono County, California." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving four (4) copies of the final environmental impact statement.

Sincerely,

Robert T. Miki
Director of Regulatory Policy

Enclosures: Memo from: Alan W. Ford
Regional Director, National Marine Fisheries Service
National Oceanic and Atmospheric Administration

Robert B. Rollins
National Ocean Survey
National Oceanic and Atmospheric Administration

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic an[redacted]ic Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
300 South Ferry Street
Terminal Island, California 90731

June 15, 1981 F/SWR33:PL

TO: Joyce M. Wood
Director, Office of Ecology and Conservation, PP/EC

FROM: Alan W. Ford
Regional Director, F/SWR

SUBJECT: Review of Draft Environmental Impact Statement (DEIS)#8105.10(CE) U.S. Navy Deepening of Pinole Shoal and Mare Island Strait, California. Regulatory Permit Application No. 12859-24 (April 1981).

A. Purpose

The purpose of this memorandum is to provide the National Marine Fisheries Service's (NMFS) comments on the subject DEIS and to make recommendations concerning:

1. Timing of dredging/disposal.
2. Disposal sites for dredged material.
3. Restoration of Island Number 1.
4. Methods of dredging and disposal.
5. Preference for dredging/disposal alternatives.

B. Background Information and Recommendations

1. Fish Migration

Migration of anadromous fish is seasonal and occurs primarily from April to June and from November to January (DEIS, Paragraph (P.) 4.80, page 35).

Recommendation:

1 Schedule of dredging and disposal to occur during February to March and during July to October for all alternatives. (Timing is now only included for alternative 3, hydraulic cutterhead dredging with land disposal.)

2. Sediment Contaminant Levels

In the San Pablo Bay - Carquinez Strait area, contaminant levels for lead, zinc, cadmium, copper, and oil and grease are 19-43 percent higher in the surface (0.0 to -0.6 feet) sediments than in the subsurface (greater than -0.6 feet) sediments. For example, the mean concentration for lead is 57.5 parts per million (ppm) in surface sediments and 32.7 ppm in subsurface sediments. Similarly, the mean concentration of mercury is 1.07 ppm in the surface sediments and 0.68 in the subsurface sediments (DEIS, Table 2, page 28).

The sediment in the Mare Island Strait area is a silty-clay and the sediment in the Pinole Shoal area is a fine sand (DEIS, P. 4.40, page 22). The distribution of contaminants is related to the sediment types in these areas. The sediments in Mare Island Strait have a higher contaminant level than the sediments in Pinole Shoal (DEIS, P. 4.40, page 27).

Recommendation:

2 Disposal of the most contaminated dredged material at a land site, and disposal of the least contaminated material at the aquatic sites would have less of an adverse impact on the estuarine system than aquatic disposal of all of the material. Material dredged to maintain the Pinole Shoal channel could be placed at the San Pablo Bay site. Material dredged to maintain Mare Island Strait should be placed at long-term land disposal site(s). The existing land disposal site at Mare Island and a portion of the proposed site at Island Number 1 should be managed as long-term disposal sites.

3. Marsh Restoration - Island Number 1

Island Number 1 is a diked, historic marshland and is now farmland. It is bounded by South Slough to the north, Dutchman Slough to the east and Highway 37 to the south and west. It is west of Vallejo, California. Elevations on the site range from -1 foot to +48 feet Mean Sea Level (MSL) (DEIS, P. 4.15, page 22). Portions of the island could be restored to a tidal salt marsh (DEIS, P. 4.95, page 37).

Recommendation:

3 A portion of Island Number 1 should be restored to tidal salt marsh to mitigate the adverse effects from filling restorable, historic marshlands at Island Number 1.

4. Dredging/Disposal Methods

The type of dredge and disposal method dictates the degree of impact on water quality, benthos, and fish. Based on a review of the information in the DEIS, hydraulic cutterhead dredging with land disposal would have the least adverse impact on all three factors. Conversely, hydraulic cutterhead dredging with aquatic disposal would have the greatest adverse impact on all three factors.

Clamshell and hopper dredges with aquatic disposal have similar effects on water quality and benthos. The clamshell method results in more mounding and less of a fluid mud layer on the bottom than the hopper method.

Hopper dredge/disposal has less of an adverse impact on fish than the clamshell method.

Recommendation:

Dredging with aquatic disposal should use a hopper or, if not feasible, a clamshell dredge.

4

C. The following list prioritizes our preference for the alternatives in the DEIS:

1. Alternative No. 3 -- hydraulic cutterhead dredging with land disposal with appropriate mitigation (not included in description).

2. Alternative No. 2B -- hopper dredging with aquatic disposal.

3. Alternative No. 2A -- clamshell dredging with aquatic disposal.

4. Alternative No. 2C -- hydraulic cutterhead dredging with aquatic disposal.

Clearance: Signature and Date

F/HP _____ 6/23/81

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md 20852

1981

OA/C52x6:JVZ

TO: PP/EC - Joyce M. Wood

FROM: OA/C5 - Robert B. Rollins

SUBJECT: DEIS #8105.10 - U.S. Navy Deepening of Pinole Shoal and Mare Island Strait, Solano County, California

The subject statement has been reviewed within the areas of the National Ocean Survey's (NOS) responsibility and expertise, and in terms of the impact of the proposed action on NOS activities and projects.

The National Ocean Survey in cooperation with the U.S. Geological Survey has been conducting a circulatory survey in the greater San Francisco Bay area. The fieldwork was carried out in 1979 and 1980, and the data are presently being processed. The target date for the first draft of the data report is March 1982. Copies of this report, containing stations in the Pinole Shoal and Mare Island Strait areas, may be obtained by writing:

Chief, Circulatory Surveys Branch
Office of Oceanography
National Ocean Survey, NOAA
6001 Executive Blvd.
Rockville, Maryland 20852

RESPONSES TO COMMENTS BY U.S. DEPARTMENT OF COMMERCE (2 JULY 1981)

1. Every attempt would be made to comply with the recommended dredging schedule in so far as is operationally possible.

2. Tables 3 and 4 of Appendix C and paragraph 4.49 of the environmental impact statement indicate no appreciable difference in sediment sample contaminant levels between Pinole Shoal and Mare Island, and that aquatic disposal of dredged material would not exceed state water quality control criteria. Also, these results are from elutriate analyses which have been shown to correlate with bioavailabilty whereas the bulk sediment concentrations shown in Table 2 of the envirnmental impact statement have repeatedly shown no correlation to either bioavailability or bioaccumulation.

3. Land acquisition would be required in order to restore Island No. 1 to tidal salt marsh. The Navy's authorization for the proposed project did not include authority for land acquisition. To seek such approval and authority from Congress would take about three years. Given the length of time required for land acquisition authority versus the expected arrival of the first Navy vessel in the Spring of 1982, it does not appear that Salt Marsh restoration is viable.

4. Comment noted.

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
PACIFIC SOUTHWEST REGION
BOX 36098 • 450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102
(415) 556-8200

ER 81/986

June 19, 1981

Colonel Paul Bazilwich, Jr.
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, California 94105

Dear Colonel Bazilwich, Jr.

The Department of the Interior has reviewed the environmental statement, U.S. Navy Deepening of Pinole Shoal and Mare Island Strait, Solano County, California. We have some comments and recommendations for your consideration and review.

General Comments

1 The draft EIS addresses the general factors to be considered in the evaluation of the subject permit application. However, it is inadequate in its review and discussion of possible alternative dredge spoil disposal sites and biological and economic data.

Specific Comments

2 Page 2, Beneficial/Adverse Impacts: In view of the expected temporary increase in sediment suspension and turbidity, the statement should consider measures such as turbidity curtains to control the migration of resuspended materials during dredging and aquatic disposal activities.

3 Para. 3.13: The volume of dredged material from the maintenance dredging associated with a deeper channel is estimated at up to 1,500,000 cubic yards. However, paragraph 4.27 states that an increased dredging quantity of 400,000 cubic yards is considered a more probable estimate. Paragraph 3.13 should be modified to reflect the "more probable" figure.

4 The capacity of the Navy's existing dredge disposal ponds at Mare Island is approximately 6,500,000 cubic yards. If this site is used for deposition of the new dredge spoils (1,600,000 cubic yards), including water, the required capacity could range from approximately 1,200,000 - 6,120,000 cubic yards, well within the amount necessary for proper management of existing ponds.

4 cont. Hence, when maintenance dredging is required within one year from the new dredging, the material may decant sufficiently to afford additional capacity to accommodate the 500,000 cubic yards annually dredged by the U.S. Navy and 400,000 cubic yards estimated as "most probable" for the maintenance dredging to be performed by the Corps of Engineers.

5 Paragraphs 3.17 through 3.19, a., b., and c.: The summary of significant impacts is too brief. Additional adverse impacts to aquatic resources should be included as follows:

	Adverse Impacts
Water Quality	Resuspension and redistribution of heavy metals and chemicals, including pesticides.
	Reduction in euphotic zone resulting from turbidity and siltation.
Benthos	Smothering of benthic and epibenthic organisms.
Fish	Inhibition of respiratory exchange through clogging of gills and the abrasive action of gill filaments.
	Interference with migration routes.

Paragraph 3.20: This alternative discusses hydraulic cutterhead dredging with aquatic disposal of Pinole Shoal dredged material (100,000 cubic yards) and land disposal for Mare Island Strait dredged material (1,500,000 cubic yards). Even though the adverse effects to aquatic resources at the dredge site would remain, this alternative would minimize adverse impacts to fish and benthic organisms at the disposal site. The Fish and Wildlife Service (FWS) generally encourages use of an upland site so that long-term adverse effects to aquatic resources can be minimized. However, since filling the site included for review as Alternative #3 (Island No. 1 - Cullinan Ranch) would likely result in its development and complete loss of values to fish and wildlife, it is not recommended as a viable alternative, unless it is modified to include marsh creation on the entire site in conjunction with dredge long-term spoil disposal. 6 This was recommended in the FWS preliminary report dated November 9, 1979, regarding PN 10359-24 and in a subsequent letter to you dated October 17, 1980, in which it was pointed out that the Cullinan Ranch, diked-off former tidelands, may be a suitable site for marsh creation.

Implementation of this suggested alternative could provide a multitude of public benefits. For fish and wildlife resources, the site could be transformed into a restored salt marsh, providing habitat for migratory waterfowl, endangered species, and an opportunity to return the area to the full biological productivity of the San Francisco Bay ecosystem, thereby enhancing its whole realm of aquatic resources.

For the U.S. Navy and Army Corps of Engi... provide a long-term disposal site for the large volumes of ma... or new dredging required concomitant with operation of the ...ilities at Mare Island. There could be distinct economic ... the discussion alternatives, paragraph 4.202). Therefor... ecommended that you include an additional alternative whi... land disposal in conjunction with marsh creation, to b... Final EIS, so that commenting individuals and agencies ... ed an opportunity to evaluate the best practicable alterna... ction of such an alternative(s) would satisfy NEPA Regu... Chapter V, Section 1505.2, which directs agencies to speci... ntally preferable alternative(s) in order to ensure cons... tion which most effectively promotes national environme... oals.

7

There is [also] disagreement with the ... significant impact is expected in the area. The reason ... an EIS is expectation of major adverse environmental ... aquatic disposal of dredge spoils would be especially dam... Day and the Carquinez Strait, a major corridor for anadromous ... e.g., salmon, sturgeon, steelhead and striped bass).

8

Table 1, p. 16, and Paragraph 3.24: Rep... Army Corps of Engineers Regulations, 33 CFR, Chapter II, Secti... pts you to adopt the following management practices in connec... charge material:

9

"(1) Discharges of dredged or f... waters of the United State... or minimized through the use ... cal alternatives;

(3) Discharges should not restri... movement of aquatic species ... waters..."

Paragraph 4.202: Mere reference to the ... Environmental Statement, Maintenance Dredging San Francis... l constitutes an inadequate analysis of the dredging an... the alternatives included in the draft EIS. Also, a rela... derived from these several-year-old studies dated December ... 1974, respectively, is inappropriate. Use of generalities ... appropriate if a dredge spoil disposal site had not been ident... in this case, Island No. 1 - Cullinan Ranch was included a... te for receipt of dredge spoils from Mare Island Strait. ... No. 1 should be considered in the final EIS in a specifi... a general one. Such cost analysis should be expanded to in... and No. 1 as a long-term disposal site in conjunction with ... Island No. 1 has been identified as a potential marsh reclama... Dredge Disposal Study, Appendix A. As indicated in that Ap... ment may be an attractive, economically feasible alternati... jects located near suitable diked lowlands. Also, as not... the Alameda Creek marsh development project proved to be ... ractical method for disposal.

10

11 So far, it has not been shown that the use of Island No. 1 with marsh creation is feasible nor infeasible. Based on the land purchase costs, site evaluation, costs for land disposal and sculpturing, this alternative could prove cost effective. Other factors which could make land disposal with marsh creation a viable, beneficial alternative include reduction in the amount of maintenance dredging required since shoaling would be minimized, and the high value of environmental benefits. Also,

12 with the increased fuel costs to operate the barges, aquatic disposal will become increasingly expensive and outmoded relative to other alternatives. Further, Section 150 of the Water Resources Development Act would authorize up to $400,000 per maintenance dredging cycle for wetlands establishment. This could amount to $800,000 per year (2 maintenance cycles per year) that could be used to offset the cost of marsh creation on Island No. 1.

As referenced in the FWS report dated January 7, 1975, to your District Engineer, San Francisco District, regarding Appendix J to the Corps Dredge Disposal Study, James A. Gosselink, Eugene P. Odum, and R. M. Pope pointed out in their publication, "The Value of a Tidal Marsh" (1974) the annual value of a tidal marsh for waste assimilation and total life support work is $4,150 and $83,000 per acre, respectively. These nationally recognized authorities on marsh and aquatic ecology and economics indicate that marshes must be evaluated as a renewable resource, the value of which increases with urban-industrial development. Updating these figures to current value results in waste assimilation and total life support values of $7,400 and $148,000, respectively. When combined, the values result in a total of $155,400/acre. Using these values in relation to tidal marsh creation on the Cullinan Ranch, which is approximately 1,500 acres in size, the total annual value of Cullinan Ranch as a tidal marsh would be $233,100,000.

In your Draft Composite Environmental Statement, dated July 1975, you estimated the total social value of salt marshes to be $50,000-80,000/acre. The Environmental Statement further states, "It is now recognized that not only should existing marshes be preserved in their natural state, but that those areas of former marsh which are able to be reclaimed as marshland should be converted if feasible."

Also, a report prepared for the U.S. Fish and Wildlife Service by Harvey & Stanley Associates, entitled, "Potential Marsh Restoration Using Dredge Materials from USGS Marine Base, Redwood City," a copy of which has been furnished your San Francisco staff, confirmed that marsh restoration using dredge spoils is economically feasible at Bair Island. Analysis was presented for 3 alternative dredge and disposal schemes. A summary of the results

13 of the present worth analysis follows:

	Hopper dredge Alcatraz Disposal	Clamshell dredge Alcatraz Disposal	Hydraulic dredge Marsh Restoration
Present Worth	$6,475,000	$5,100,000	$5,190,000

14 Finally the EIS should include the estimated cost of the project with aquatic disposal, i.e., Alternatives #2-A and #2-B, and #2-C, including associated maintenance dredging costs associated over the next 20 years. Also, if the maintenance dredging will be performed by contract with private industry using hopper clamshell dredges, the relative cost index requires revision.

15 Paragraph 4.43: Projected levels of turbidity associated with Alternative #2 and #3 should be included.

16 Paragraphs 4.74 and 4.84: A special report prepared by the U.S. Fish and Wildlife Service, entitled "Effects on Fish Resources of Dredging and Spoil Disposal in San Francisco and San Pablo Bays, California" (November 1970) noted significant adverse impacts on benthos and fish due to dredging and disposal operations. The study revealed that the numerical abundance of benthic organisms, demersal fish, and shrimp was significantly lower in dredged than in undredged channel areas. The study further found that significant effects of spoiling on biological populations are relatively short-term (i.e., less than 6 years). However, there is particularly concerned that with the proposed new dredging and concomitant maintenance dredging of up to 1,500,000 cubic yards per year at Mare Island Strait and disposal of this and other dredged spoil material within the Carquinez, the so-called "temporary" adverse impacts to benthos and fish described in the draft EIS will in fact become permanent. In other words, the benthic and demersal fish community may never have a chance to reestablish itself to a productive level. This could be particularly devasting to fish populations which use the Carquinex Strait migratory corridor. Present indicators of the drastic decline in fish populations within the Sacramento-San Joaquin-San Francisco Bay system lead us to suspect that synergistic effects, including the adverse effects associated with dredge spoil disposal, may be responsible for heretofore noted declines.

17 Paragraph 4.95: See comments regarding paragraph 3.20 on page 2.

18 Paragraph 5.00: Alternative #2-C should be designated as having the potential for destruction of fish from disposal operations. In fact, this alternative probably has the greatest fish destruction potential as a result of increased possibility of fluid mud flow formation.

19 Appendix D, Fish and Wildlife: A list of benthic species of the study area should be included.

20 Summary Comments: It is fully recognized that there is certainly a need to our maintain our vital navigation channels to accommodate deep draft vessels required for our national defense. Obviously, the adverse impacts to fish and wildlife resources in the dredge area are unavoidable if the channel is to be maintained. However, this is not the case in the spoil disposal area. Hence, while the need for the dredging portion of the project is not questioned, the need for aquatic disposal of dredge spoils in San Pablo Bay and the Carquinez Strait is questioned. Further, it is recommended that Island No. 1 be used as a disposal site only if the entire site is used for the purpose of long-term disposal of dredge spoils in conjunction with marsh creation.

In view of the above, it is felt that the Corps of Engineers' analysis of possible disposal alternatives is inadequate. Because of the adverse impacts to fish and wildlife resources associated with aquatic disposal of dredge spoils and the public gains to be obtained by using dredge material for marsh creation, it is recommended that the U. S. Navy, as well as you, seriously consider the long-term practicability of dredge spoil disposal with marsh creation at Island No. 1, or secondarily, use of the Navy's existing dredge disposal ponds at Mare Island.

20 cont.

Finally, it is recommended that hydraulic dredging not be used if open-water disposal is utilized (Alternative #2-C).

We appreciate the opportunity to review and comment on this application.

Sincerely,

Patricia Sanderson Port
Regional Environmental Officer

cc: Director, OEPR (w/copy incoming)
Director, Fish and Wildlife Service
Director, National Park Service
Director, Geological Survey
Director, Bureau of Mines
Reg. Dir., FWS
Reg. Dir., NPS
Reg. Dir., GS
Reg. Dir., BM

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
PACIFIC SOUTHWEST REGION
BOX 36098 • 450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102
(415) 556-8200

July 16, 1981

ER 81/986

Colonel Paul Bazilwich, Jr.
San Francisco District
Corps of Engineers
211 Main Street
San Francisco, CA 94105

Dear Col. Bazilwich:

My letter to you of June 19, 1981 concerning the EIS prepared for the U.S. Navy Deepening of Pinole Shoal and Mare Island Strait, Solano County, California, inadvertently was missing a paragraph. The missing paragraph follows:

21 Paragraph 3.22: We disagree with the statement that Alternatives 2-A, 2-B and 2-C would not conflict with any plans, policies, or regulations (see FWS comment regarding paragraph 3.24). Further, Alternative #3, if combined with marsh creation, would not likely conflict with E.O. 11988 (Floodplain Management).

I hope this clarifies our previous letter.

Sincerely yours,

Patricia Sanderson Port
Regional Environmental Officer

RESPONSES TO COMMENTS BY THE U.S. DEPARTMENT OF THE INTERIOR (19 JUNE 1981 and 16 JULY 1981)

1. It is our judgement that all feasible alternatives have been adequately addressed and the associated biological and economic impacts have been considered.

2. The effectiveness of turbidity curtains to control the dispersion of turbid water during dredging and aquatic disposal activities has been studied (reference Dredged Material Research Program Technical Report D-78-39 "An Analysis of the Functional Capabilities and Performance of Silt Curtains", July 1978). These studies indicated that the effectiveness of turbidity curtains depends upon the nature of the operation, the characteristics of the material in suspension, the type, condition and deployment of the turbidity curtain, the configuration of the enclosure, and the hydrodynamic regime present at the site. The effectiveness of turbidity curtains decreases as the current velocity in the area increases due to flare of the curtain and resuspension of sediment. Current velocities of about one knot appear to be the practical limiting condition for turbidity curtain use with respect to overall effectiveness and deployment considerations. Given the relatively high ambient levels of turbidity and average current velocities greater than one knot at the proposed dredge and aquatic disposal sites, the use of turbidity curtains to control the dispersion of turbid water during the proposed project construction is not considered an effective or appropriate measure.

3. The "more probable" (i.e. an estimated additional 400,000 cubic yards of maintenance dredging associated with the deeper channel) figure is included in pargraph 3.13 as part of the range (i.e. between 2,000,000 cys. and 3,500,000 cys.) of estimated dredging volumes. The estimated 8,780,000 cys. to 15,000,000 cys. (reference paragraph 3.13) required for proper pond management reflects the range of 2,000,000 cys. to 3,500,000 of dredged material in-situ.

4. The stated range of from "...approximately 4,200,000 - 6,420,000 cubic yards..." is an over estimation and the analysis fails to account for proper pond management requirements of at least twice the volume of dredged material in-situ plus water.

Land disposal of 1,600,000 cys. of dredged material would result in a dredging volume of 3,560,000 cys. when water is included. Proper pond management would require a volume equivalent to twice the volume of dredged material in-situ plus water or in this case 7,120,000 cys. which exceeds the existing dredge pond capacity of the Mare Island disposal site. In addition to the 1,600,000 cys., the Navy's annual maintenance dredging of 500,000 cys. would require a dredge pond capacity of 2,120,000 cys. (500,000 cys. plus water equals 1,060,000 cys. times 2 equals a volume of 2,120,000 cys.) in order to practice proper pond management of the land disposal site. Also, the paragraph incorrectly assumes that the Navy's annual maintenance dredging requirement of 500,000 cys. is a "once a year activity". The Navy's maintenance dredging operation is ongoing throughout the year.

5. Paragraphs 3.17 through 3.19, a., b., and c. have been revised to include the listed additional impacts. However, the additional adverse impact of "interference with migration routes" is not considered to connote an unacceptable migration zone of passage. A conservative estimate of the dimensions of the plume from disposal by hopper dredge at Carquinez Strait (estimated to represent the largest plume cross-section of the aquatic disposal alternatives considered in this statement) is a cross-sectional area of 3,800 square meters. This cross-sectional area represents about 24 percent of the cross-sectional area available to migrating fish in Carquinez Strait (the cross-sectional dimensions of the Strait are approximated at 13 meters in depth and 1210 meters in width). Mobile fish species would be able to avoid a cross-sectional area of this size.

6. Although Alternative #3 would result in loss of values to wildlife when compared to the existing condition, this loss could be compensated if mitigative measures as described in paragraph 4.95 were incorporated. The primary purpose of the proposed project is to provide safe navigable channels for a new class of Navy vessel, (reference paragraphs 1.04 and 2.00) not to provide a marsh restoration project for the entire Island No. 1 - Cullinan Ranch site. The existing project authority does not include authority for land acquisition. To seek such approval and authority from Congress would take about three years. Although land disposal with mitigation is described in the environmental impact statement (reference paragraph 4.95), evaluation of Alternative #3 for long-term use as a disposal site presents concerns for its viability due to the finite capacity of a land disposal site.

7. See response to comment number 6. Also, individuals and agencies have been afforded an opportunity to comment on the array of practicable alternatives.

8. This paragraph apparently refers to paragraph 3.24 of the DEIS. The final sentence in pargraph 3.24 has been deleted. There is no evidence that aquatic disposal of dredged material is especially damaging in San Pablo Bay and the Carquinez Strait. Also, refer to response to comment number 5.

9. The referenced 33 CFR Part 323.4(b) is not applicable as it refers to only nationwide permitted activities. The Navy's proposed deepening of Pinole Shoal and Mare Island Strait is an individual permit action (reference 33 CFR Part 323.3(b)).

10. Reference to the Final Composite Environmental Statement and Appendix J is a valid analysis of the economic comparison of alternative dredging and disposal systems as related to the alternatives considered in this environmental impact statement. The relative costs shown in paragraph 4.205 were derived from current cost estimates by method of dredging as applies to the alternatives specified in the EIS. In addition, the relative cost shown for Alternative #3 excludes land acquisition costs. The relative costs reflected in paragraph 4.205 support the results shown in the Final Composite Environmental Statement and Appendix J. Alternative #3 (land disposal on Island No. 1) costs as related to the other alternatives are specifically

considered. A cost analysis for use of Island No. 1 as a long-term disposal site in conjunction with marsh creation is not warranted given the purpose of the project to provide safe navigation for SSN 688 Class submarines, the lack of land acquisition authorization, and the finite capacity of a land site not providing a solution to the long term maintenance requirement (reference response to comment number 6).

11. See response to comment number 6.

12. Land disposal with marsh creation would not minimize shoaling since shoaling is an independent phenomenon. The statement that aquatic disposal will become increasingly expensive and outmoded relative to other alternatives due to increased fuel costs to operate barges is erroneous. This incorrectly assumes that certain plant and operating costs are changing at different rates. Section 150 of the Water Resources Development Act refers to Corps water resource develoment projects and does not apply to permit activities under the Corps' regulatory program (Reference Section 150 of the Water Resources Development Act of 1976 and 33 CFR Part 232 which is the proposed rule for implementing Section 150 of the Act).

13. It is noted the figures presented (i.e. $6,475,000, $5,100,000, and $5,190,000) in the referenced study represent a comparison of total project costs for a forty year life dredging project. Also, it is noted that the alternatives considered reflect a cost comparison based on a land disposal site in close proximity to the dredging site versus aquatic disposal at a site twenty-three miles from the dredging site. The alternatives considered in this environmental impact statement do not reflect a disproportionate distance between the dredge/land disposal sites and the dredge/aquatic disposal sites.

14. Costs, expressed in relative terms for alternatives #2-A, #2-B, and #2-C are shown in paragraph 4.205. The relative costs shown in paragraph 4.205 are also considered valid and representative of maintenance dredging costs over the next twerty years. Also, paragraph 4.205 reflects relative dredging costs based on the work being performed by contract with private industry.

15. Laboratory analyses of water samples have shown that Alternative #2-A (clamshell dredging) increases turbidity by a magnitude of 13 over background dredge site lower water column levels (from 22 mg/l to 282 mg/l at 50 meters downcurrent of the dredging). Turbidity levels associated with Alternative #2-B (hopper dredging) increased by a magnitude of 2 (from 158 mg/l to 389 mg/l) and Alternatives #2-C and #3 (hydraulic cutterhead dredging) resulted in increased turbidity levels on the order of twice the background level (from 52 mg/l to 115 mg/l at 50 meters downcurrent of the dredging. These laboratory analyses"...generally substantiate the impressions developed from the water column monitoring". (Reference VI Proceedings of WODCON, World Dredging Conference, "Alternative Dredging Methods - Relative Physical Impact," by Wakeman, Sustar, and Dickson, Berth 84, P.O. Box 1800, San Pedro, CA 90733).

16. The proposed dredging of Pinole Shoal and Mare Island Strait considered in this environmental impact statement does not include dredging in new

channel ways. The proposed dredging is only concerned with deepening existing channels which are maintained by dredging on a scheduled cycle. The duration of dredging an initial 1,500,000 cys. of material as well as project associated future maintenance volumes of up to 1,500,000 cys. from Mare Island Strait is estimated to take an additional 20 to 38 days when compared to the existing annual dredging which occurs in Mare Island Strait. The additional duration of dredging associated with a deeper channel at Mare Island Strait is not considered to preclude the reestablishment of the benthic and demersal fish community.

17. See response to comment numbers 6 and 7.

18. It is unlikely that formation of a fluid mud layer would destroy fish, given their mobility and avoidance reaction capabililty.

19. A master list of benthic species found in the study area has been included in Appendix D of this environmental impact statement.

20. The summary comments have been addressed in responses to the specific comments.

21. There appears to be no basis for disagreement with the statement in paragraph 3.22 that Alternatives #2-A, #2-B, and #2-C would not conflict with any plans, policies, or regulations as referenced by the FWS comment regarding paragraph 3.24. Paragraph 3.24 concerns protection of wetlands as related to Alternative #3 while Alternatives #2-A, #2-B, and #2-C apply to dredging with aquatic disposal in open water. The statement "... Alternative #3, if combined with marsh creation would not likely conflict with E.O. 11988 (Floodplain Management)." is noted and essentially is iterated in paragraph 3.23.

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION NINE
Two Embarcadero Center, Suite 530
San Francisco, California 94111

ARIZONA
CALIFORNIA
NEVADA
HAWAII
GUAM
AMERICAN SAMOA

June 1, 1981

IN REPLY REFER TO
HEP-09

Colonel Paul Bazilwich, Jr.
San Francisco District Engineer
U.S. Army Corps of Engineers
211 Main Street
San Francisco, California 94105

Dear Colonel Bazilwich:

We have reviewed the draft environmental impact statement for the U.S. Navy Deepening of Pinole Shoal and Mare Island Strait in Solano County, California, and provide the following comment.

Alternative 3 includes land disposal of dredge material from Mare Island Strait on Island No. 1 and Cullinan Ranch (Plate No. 5). Will this land disposal involve truck haul routes over public roadways? If so, the environmental statement needs to identify the routes and describe any resulting impacts. This discussion should include roadway damage caused by excessive weight, traffic delays and motorist safety, noise and dust impacts, hours of operation, and duration of project.

We appreciate this opportunity to review the subject draft EIS and would like to receive a copy of the final statement when it becomes available.

Willis Kisselburg, Jr.
Acting Director, Office of
Environmental Programs

RESPONSE TO COMMENT BY THE U. S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION (1 JUNE 1981)

Alternative No. 3 considers dredging Mare Island Strait with disposal of the dredged material on Island No. 1 - Cullinan Ranch by pipeline only. Land disposal of dredged material from Mare Island Strait by use of truck hauls is not anticipated for the proposed project.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

Project #D-COE-K32027-CA

JUL 1981

Colonel Paul Bazilwich, Jr., District Engineer
U.S. Army Engineer District, San Francisco
211 Main Street
San Francisco CA 94105

Dear Colonel Bazilwich:

The Environmental Protection Agency (EPA) has received and reviewed the Draft Environmental Impact Statement (DEIS) titled U.S. NAVY DEEPENING OF PINOLE SHOAL AND MARE ISLAND STRAIT.

The EPA's comments on the DEIS have been classified as Category LO-2. Definitions of the categories are provided in the enclosure. The classification and the date of the EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal Actions under Section 309 of the Clean Air Act. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and the adequacy of the environmental statement.

The EPA appreciates the opportunity to comment on this DEIS and requests five copies of the Final Environmental Impact Statement when available.

If you have any questions regarding our comments, please contact Susan Sakaki, EIS Review Coordinator, at (415) 556-7858.

Sincerely yours,

Terry F. Stumph

for Sheila M. Prindiville
Acting Regional Administrator

Enclosure

General Comments

1 The DEIS does not indicate the selection of a preferred alternative. Section 1502.14(e) of the regulations for implementing the procedural provisions of the National Environmental Policy Act (NEPA) requires that the responsible agency identify the preferred alternative. The Final Environmental Impact Statement (FEIS) should identify the chosen alternative.

Water Quality Comments

1. Paragraph 3.33(b) (pg. 19) of the DEIS states that dredging will result in increased water depths, tending to increase water circulation. The basis for this statement is unclear. 2 If the channel area is increased by deepening, the stream velocity will decrease. This could cause increased sedimentation and decreased dissolved oxygen (DO) concentration.

Paragraph 4.43 (pg. 28) of the DEIS states that dredging will cause a temporary decrease in the DO concentration of one to two parts per million. 3 The U.S. Navy should be aware of the potential for decreasing the DO concentration below the 5 ppm standard and implement measures to prevent this occurrence.

Paragraph 4.47 (pg. 29) states that dredging of the Channel is not expected to cause a noticeable increase in saltwater intrusion. This appears to be reasonable given the relatively small increase in channel depth. 4 However, in light of the important beneficial uses of Delta waters and the potential for salinity intrusion, a monitoring program is needed. Additionally, a contingency plan should be prepared in the event that salinity concentrations are found to increase.

EIS CATEGORY CODES

Environmental Impact of the Action

LO—Lack of Objections

EPA has no objection to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER—Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to reassess these aspects.

EU—Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1—Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2—Insufficient Information

EPA believes that the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3—Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft impact statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

RESPONSES TO COMMENTS BY THE U. S. ENVIRONMENTAL PROTECTION AGENCY (1 JULY 1981)

1. Section 1502.14 (e) of the Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40CFR Parts 1500-1508) states in full:

> "Identify the agency's preferred alternative or alternatives, if one of more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference."

Corps regulations concerning regulatory permit actions (reference Policy and Procedures for Implementing NEPA, ER 200-2-2, Appendix B IIb.(5)(d)) prohibit the disclosure of a preferred alternative (including a chosen alternative) in environmental statements.

2. With respect to Pinole Shoal there would be some increase in circulation due to the greater channel efficiency for tidal flows. It is unknown whether water circulation would tend to increase in Mare Island Strait. However, increased sedimentation would occur but DO concentrations are a function of the sediment concentration in the water column and not the volume of sediment deposits.

3. The Navy is aware of the potential for the lowering of the 5 ppm standard for DO. The reduction in the dissolved oxygen concentration is a function of the level of oxygen consuming materials in the sediments. These levels in the project area channel sediments are not typically sufficient to cause reductions in DO below the 5/ppm standard when disposal occurs at the designated sites. For the most part, this is due to the swiftly moving currents at the designated disposal sites and the resultant rapid dilution of the released materials. In some instances the DO level of the lower Water column may drop below the 5 ppm standard but the duration lasts only several minutes.

4. Given the large daily and seasonal variations in salinity levels in channels upstream of Pinole Shoal under existing conditions, the general lack of detailed (without project) salinity concentrations, and the impossibility of obtaining identical flow conditions before and after dredging, a monitoring program would not detect any change in saltwater intrusion into the Suisun Bay/Delta system. As portions of the channel completely through Pinole Shoal are deeper than 36 feet below MLLW, the deeper water with higher salinity concentrations in the Central Bay area already has access to the upstream channels and the additional dredging, which will only widen portions of the existing channel, will only very slightly increase the efficiency of the channel.

OFFICE OF THE SECRETARY
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Department of Conservation
Department of Fish and Game
Department of Navigation and Ocean Development
Department of Parks and Recreation
Department of Water Resources

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Air Resources Board
Colorado River Board
San Francisco Bay Conservation and Development Commission
Solid Waste Management Board
State Lands Commission
State Reclamation Board
State Water Resources Control Board
Regional Water Quality Control Boards
Energy Resources Conservation and Development Commission

THE RESOURCES AGENCY OF CALIFORNIA

SACRAMENTO, CALIFORNIA

Colonel Paul Bazilwich, Jr.
U.S. Army Corps of Engineers
211 Main Street
San Francisco, CA 94105

June 19, 1981

Dear Colonel Bazilwich:

The State has reviewed the draft EIS, Deepening of Pinole Shoal and Mare Island Strait, submitted to the Office of Planning and Research. The State's review, in accordance with OMB Circular A-95 and the National Environmental Policy Act of 1969, was coordinated with the State Lands Commission, the Water Resources Control Board, and the Departments of Boating and Waterways, Conservation, Fish and Game, Parks and Recreation, Water Resources, Health, and Transportation.

The Department of Fish and Game (DFG) has extensive comments and recommendations regarding this project, which are stated in the attached memorandum of June 8, 1981. In addition, we have been informed that the San Francisco Bay Commission (BCDC) will be sending comments directly to you, and that the Department of Water Resources (DWR) will be submitting comments to the Resources Agency in the immediate future.

The significant nature of DFG's comments indicated to the State that the Corps should be sent the Department's response as quickly as possible. We will forward DWR's comments as soon as they are received, and request that you consider them, along with BCDC's comments, as part of the State's official response to this document.

We greatly appreciate having been given an opportunity to review this document.

Sincerely,

Charles K. Johnson

for JAMES W. BURNS
Assistant Secretary for Resources

(SCH 81050514)

cc: Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814

Date [illegible] 8, 1981

State Resources
141[illegible] Street
[illegible], California 95814

Attn: Jim Burns, Projects Coordinator

From : **Department of Fish and Game**

Subject: Project and Draft EIS Review Comment SCH81050514A - U.S. Navy Deepening of Pinole Shoal (Marin and Contra Costa Counties) and Mare Island Strait (Solano County)

We have reviewed the subject document which describes the proposed deepening of Pinole Shoal and Mare Island Strait to improve navigational safety of the latest naval ship design (SSN 688 class submarine) expected to arrive at Mare Island Shipyard in the spring of 1982. This project is also described in Corps of Engineers Public Notice No. 12859-24 of the San Francisco District. Public notice comments were forwarded to the Resources Agency November 6, 1979.

Comments on the Project

The Department of Fish and Game offers the following recommendations:

1. Eliminate from active consideration those alternatives or portions of alternatives for dredging and disposal presented in the DEIS which call for hydraulic cutterhead dredging with aquatic disposal. **1**

   Hydraulic cutterhead dredging and long-distance pumping results in extreme mastication and destruction of organisms, and the greatest formation of a fluid-mud layer at the aquatic disposal site.

   Such mud flows typically have suspended solids concentrations greater than 10 grams per liter and extremely low dissolved oxygen levels. The period of time necessary for consolidation varies from hours to days, thus creating a period in which the environment would be extremely stressful for benthic and epibenthic organisms.

2. For dredging Pinole Shoal, we recommend that the deepening project be accomplished by hopper dredge between the first of September and the end of December with disposal at the San Pablo Bay Disposal Site (SF 10). **2**

   Our choice of the hopper dredge over clamshell with barge is based on the hopper dredge being significantly faster, thereby reducing the duration of impacts. **3** The recommended time of year is selected to avoid migrational use of the channels by young Dungeness crabs.

3. For dredging Mare Island Strait, we recommend [illegible] with land disposal for each reach. The [illegible] plan should be developed in cooperation with the Department of Fish and Game and the Fish and Wildlife Service. 4

In addition to providing a means for restoring former tidal marsh land, land disposal of Mare Island Strait sediments would prevent their being returned to the dredged channel during spring and summer months when suspended solids are carried upstream by bottom flood currents. This would also reduce the potential for further degradation of Napa River and Napa Marsh habitat by these sediments. 5

4. We recommend a baseline investigation be undertaken to better define the period of least biological impact for dredging and aquatic disposal. A search and review of existing data should be made to determine the scope and methods to document the distribution and abundance of fishes and invertebrates by season in the dredge and disposal areas. 6

As we indicated in our response to Public Notice No. 12859-24, our major concerns relate to timing and mode of sediment relocation affecting fish and wildlife in dredged and spoil disposal areas. We recommend that a baseline investigation be conducted prior to the project. Such an investigation would have provided information useful in planning this project and will be valuable in evaluating future maintenance dredging alternatives.

The proposed project will increase the maintained depths at Pinole Shoal by one foot (from 35 to 36 feet below MLLW) and at Mare Island Strait by four feet (from 32 to 36 feet below MLLW).

According to the DEIS, deepening of Pinole Shoal and Mare Island Strait will require the removal of an estimated 1,600,000 cubic yards (cys) of material (100,000 cys from Pinole Shoal and 1,500,000 cys from Mare Island Strait). No appreciable increase in maintenance dredging volumes over the present average annual quantity of 361,000 cys is expected to be required to maintain Pinole Shoal at -36 feet MLLW. At Mare Island Strait, however, maintenance dredging is estimated by the Corps to increase from an average annual quantity of 2,230,000 cys to 2,630,000 or more cys to maintain the proposed new project depth.

Dredged materials disposal alternatives being considered in the DEIS include land disposal at Mare Island and aquatic disposal at Carquinez Strait (SF 9) and San Pablo (SF 10) sites. The two aquatic disposal sites are presently used for maintenance dredging of Pinole Shoal and Mare Island Strait. The primary difference in the proposed deepening project and historic maintenance dredging is the increased volume of sediments to be dredged. This increases the magnitude and duration of impacts on fish and wildlife during dredging and disposal.

Comments on the Draft EIS

The Department of Fish and Game offers the following recommendations:

1. Compare methods of dredging by their potential and expected impacts on fish and wildlife in project areas. Include in this discussion a comparison of how long it would take to complete the project by various methods of dredging. 7

8 [illegible] discussion of [illegible] and how these findings are useful in determining the least biologically damaging time of the year for conducting the proposed project and subsequent maintenance dredging.

9 3. Discuss the availability of different types of dredging equipment. For example, when are hopper dredges available and how does this availability fit the proposed dredging schedule?

10 4. Discuss the fate of sediments released at the Carquinez Strait (SF 9) and San Pablo Bay (SF 10) disposal sites. We are particularly concerned with the potential for increased sedimentation degrading Napa River and Napa Marsh wetlands.

General Comments

11 The summary and comparison of significant impacts by alternatives presented on pages 10-15 is very superficial. Granted, it is only a summary, but comparisons would be much more meaningful if related to the intensity, duration and significance of impacts to specific fish and invertebrates in the affected areas. For example, when the reader attempts to compare the impacts on fish caused by alternative dredge and disposal options, the reader might conclude that with aquatic disposal, hydraulic cutterhead dredging is less harmful to fish than either hopper dredging or clamshell dredging. This would be because only two hazards to fish have been used in the comparison.

Only clamshell dredging and hopper dredging are identified as having potential for covering/destruction of fish during aquatic disposal operations; the only hazard credited to hydraulic cutterhead dredging with aquatic disposal is "temporary adverse impact on respiratory structures and feeding processes," which is identified in the comparison as common to all three alternatives for dredging with aquatic disposal. We suggest that a comparison of the degree
12 and duration of these "temporary impacts" would reveal very significant differences among the dredging alternatives.

The comparison of impacts on living marine resources presented on pages 34 and 35 of the DEIS is only somewhat more specific. The relative violence of the dredging alternatives on entrapped invertebrates is compared but no
13 comparisons are provided in terms of dissolved oxygen levels or loading of suspended solids into the water column and their potential impacts on fish and invertebrates.

Avoiding dredging during major migratory periods of anadromous fishes is the only mitigation offered to reduce dredging and disposal impacts. This stance appears to be defended by the assertion that fish and benthic organisms sampling has been conducted in the general area of the project for at least the
14 last 10 years by State and Federal agencies with no indication of significant adverse impacts due to dredging and disposal activities. We recommend identifying any studies which are relevant to the environmental impact of this project, and their purpose and findings should be related to the issues in preparation of the EIS.

This concludes our review of the Draft EIS. If you wish to discuss these comments or any related concerns, please contact Mr. [illegible], Environmental Services Supervisor, Department of Fish and Game, Marine Resources Region, 350 Golden Shore, Long Beach, California 90802, or you may phone him at (213) 590-5140; ATSS 635-5140.

EC Fullerton

Director

Resources Building
1416 Ninth Street
95814

(916) 445-5656

Department of Conservation
Department of Fish and Game
Department of Forestry
Department of Boating and Waterways
Department of Parks and Recreation
Department of Water Resources

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SACRAMENTO, CALIFORNIA

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Colorado River Board
Energy Resources Conservation and Development Commission
Regional Water Quality Control Boards
San Francisco Bay Conservation and Development Commission
Solid Waste Management Board
State Coastal Conservancy
State Lands Commission
State Reclamation Board
State Water Resources Control Board

Colonel Paul Bazilwich, Jr.
District Engineer
San Francisco District
U.S. Army Corps of Engineers
211 Main Street
San Francisco, CA 94105

July [illegible] 1981

Dear Colonel Bazilwich:

In a letter dated June 19, 1981, the State transmitted comments to you from the Department of Fish and Game regarding the draft EIS, Deepening of Pinole Shoal and Mare Island Strait. In that letter we advised that the Department of Water Resources would submit comments in the immediate future.

Attached are the comments from the Department of Water Resources and it is requested that you consider them as part of the State's official response.

Sincerely,

for JAMES W. BURNS
Assistant Secretary for Resources

Attachment

cc: State Clearinghouse
Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814
(SCH # 81050514)

State of California **The Resources Agency**

Memorandum

To : Huey D. Johnson
Secretary for Resources
The Resources Agency
1416 Ninth Street, Room 1311
Sacramento, CA 95814

Attention: James W. Burns

From : **Department of Water Resources**

Date : JUL 31 1981

File No.:

Subject: Draft Environmental Impact Statement, U. S. Navy Deepening of Pinole Shoal and Mare Island Strait, Regulatory Permit Application, Public Notice 12859-24, SCH 81050514

We have reviewed the subject draft environmental impact statement which was transmitted by the State Clearinghouse Notice of Intent and have the following comments and recommendations:

The proposal of the U. S. Navy to deepen the Pinole Shoal Channel and Mare Island Strait has been reviewed in the light of any possible adverse effects that the project could have on fresh water supplies upstream of the project. For the purposes of assessing these effects, we considered the Mare Island Strait deepening and Pinole Channel deepening separately.

Mare Island Strait

Deepening of the Mare Island Strait in our opinion will not have any appreciable effect on salinities in the Delta, and although the deepening may increase salinities in the tidal prism of the Napa River and connecting sloughs, we are not aware of any diversions that exist in this region of the Napa River south of Trancas Road. The Department therefore has no objection to this portion of the Navy project.

Pinole Shoal

With respect to the Pinole Shoal portion, model studies of the John F. Baldwin Ship Channel deepening by the U. S. Army Corps of Engineers on the Bay-Delta model in Sausalito indicate that 10 feet of deepening (to -49 feet MLLW) would have an adverse effect on Delta salinities. We are very concerned about any deepening of the ship channels that would result in increased salinity intrusion into the Delta. We completed a letter of agreement dated February 3, 1981, with the Corps of Engineers to conduct further detailed studies on the Bay-Delta model to better determine if there are any adverse effects and, if necessary, mitigating measures for the deepening of Stockton and Sacramento River Deep Water Ship Channels. Our views with regard to the Sacramento and Stockton Ship Channel Projects are applicable to the Pinole project as well.

As the draft environmental impact statement mentions on page 29, the Bay-Delta physical model may not be capable of measuring or detecting the effect on upstream salinity of the one-foot deepening of Pinole Shoal as proposed by the Navy. The Navy should sponsor studies on the Bay-Delta model by the Corps to determine if the salinity effects can be measured and to determine the degree of mitigation required, if any. If the effect of the Navy project cannot be measured on the model, the effect might be approximated by taking a portion of the effect of a larger project, such as the Corps' proposal to deepen the Pinole Shoal by 10 feet, which the Corps has concluded would have a demonstrable effect on upstream salinities. We are of the opinion that the Navy should share in the cost of any mitigation project that may be required for deepening the Pinole Shoal.

15

Ronald B. Robie
Director
8-485-6582

State of California **The Resources Agency**

Memorandum

To : Huey D. Johnson
Secretary for Resources
The Resources Agency
1416 Ninth Street, Room 1311
Sacramento, CA 95814

Attention: James W. Burns

From : **Department of Water Resources**

Date : JUL 3 1981

File No.:

Subject: Draft Environmental Impact Statement, U. S. Navy Deepening of Pinole Shoal and Mare Island Strait, Regulatory Permit Application, Public Notice 12859-24, SCH 81050514

We have reviewed the subject draft environmental impact statement which was transmitted by the State Clearinghouse Notice of Intent and have the following comments and recommendations:

The proposal of the U. S. Navy to deepen the Pinole Shoal Channel and Mare Island Strait has been reviewed in the light of any possible adverse effects that the project could have on fresh water supplies upstream of the project. For the purposes of assessing these effects, we considered the Mare Island Strait deepening and Pinole Channel deepening separately.

Mare Island Strait

Deepening of the Mare Island Strait in our opinion will not have any appreciable effect on salinities in the Delta, and although the deepening may increase salinities in the tidal prism of the Napa River and connecting sloughs, we are not aware of any diversions that exist in this region of the Napa River south of Trancas Road. The Department therefore has no objection to this portion of the Navy project.

Pinole Shoal

With respect to the Pinole Shoal portion, model studies of the John F. Baldwin Ship Channel deepening by the U. S. Army Corps of Engineers on the Bay-Delta model in Sausalito indicate that 10 feet of deepening (to -45 feet MLLW) would have an adverse effect on Delta salinities. We are very concerned about any deepening of the ship channels that would result in increased salinity intrusion into the Delta. We completed a letter of agreement dated February 3, 1981, with the Corps of Engineers to conduct further detailed studies on the Bay-Delta model to better determine if there are any adverse effects and, if necessary, mitigating measures for the deepening of Stockton and Sacramento River Deep Water Ship Channels. Our views with regard to the Sacramento and Stockton Ship Channel Projects are applicable to the Pinole project as well.

As the draft environmental impact statement mentions on page 79, the Bay-Delta physical model may not be capable of measuring or detecting the effect on upstream salinity of the one-foot deepening of Pinole Shoal as proposed by the Navy. The Navy should sponsor studies on the Bay-Delta model by the Corps to determine if the salinity effects can be measured and to determine the degree of mitigation required, if any. If the effect of the Navy project cannot be measured on the model, the effect might be approximated by taking a portion of the effect of a larger project, such as the Corps' proposal to deepen the Pinole Shoal by 10 feet, which the Corps has concluded would have a demonstrable effect on upstream salinities. We are of the opinion that the Navy should share in the cost of any mitigation project that may be required for deepening the Pinole Shoal.

15

Ronald B. Robie
Director
8-485-6582

RESPONSES TO COMMENTS BY THE RESOURCES AGENCY OF CALIFORNIA
(19 JUNE 1981 and 3 JULY 1981)

1. The purpose of an EIS is to provide the decision maker with alternatives for accomplishing the proposed project. The deletion of Alternative #2-C from the final EIS after it has been considered, analyzed and commented on as part of the draft EIS would inhibit the decision makers ability to make an informed decision.

2. Every attempt would be made to comply with the recommended timing of dredging Pinole Shoal in so far as is operationally possible.

3. It is noted that the proposed deepening of Pinole Shoal and Mare Island Strait would take about the same duration regardless of the dredging method since the dredging contract would specify a production quota independent of the dredging method.

4. The primary purpose of the proposed project is to provide safe navigable channels for a new class of Navy vessel (reference paragraphs 1.04 and 2.00) not to provide a marsh restoration project. The Navy's authorization for the proposed project did not include authority for land acquisition. To seek land acquisition authority from Congress would take approximately three years. Given the length of time required for land acquisition authority versus the planned spring 1982 arrival of the Navy's new class of vessel, marsh restoration does not appear to be viable. In addition, land disposal with marsh restoration does not provide a solution to the long term maintenance dredging requirement given the finite capacity of a land disposal site.

5. Studies have concluded that based on the dispersion of sediments throughout the system and the decay rate of sediments returning to Mare Island Strait channel, a maximum return of suspended sediments from dredging operations is estimated to be 15 percent (reference Appendix E - Material Release, Dredge Disposal Study, dated August 1977). This estimated 15 percent return of dredged sediments is not significant when compared to the suspended sediment loads which enter Mare Island Strait via the Napa River and Delta from natural erosion processes. In addition, the homogeneity of these sediment sources and the Mare Island dredged material is not expected to cause any degradation of the Napa River or Napa marsh.

6. The need for new baseline investigations is questionable given the existing data which is available for interpretation. A list of the available data for the San Francisco Bay and Delta follows:

a. State Department of Water Resources
   - 1968 to present (once per month)
   - Carquinez Strait to Stockton
   - phytoplankton - cell counts; chlorphyll a

b. U.S. Geological Survey
   - 1975 to present (once per month)
   - San Jose to Rio Vista
- phytoplankton; zooplankton

c. University of California-Davis
   - 1976 (24 hour studies)
   - phytoplankton - cell counts; zooplankton; larval fish
d. State Department of Fish & Game

   1.

   - 1968 to 1977 (April to July with sampling every two days)
   - Carquinez Strait to Stockton
   - egg and larval fish tows

   2.

   - 1961 to present (summer tow net surey)
   - Carquinez Strait
   - Stripped bass (20-50mm juveniles)

   3.

   -1967 to present (August to March-monthly)
   - Golden Gate to Stockton
   - all fish (mid-water trawls)

   4.
   - Early 1960's
   - San Pablo Bay and Delta
   - Benthic surveys
   5.
   - 1971 to present (twenty samples per year)
   - Carquinez Strait to Stockton
   - zooplankton
   - neomysis (1968 to present)

Recommendations for appropriate times to conduct dredging and disposal operations from both the National Marine Fisheries Services (February to March and July to Occtober - reference Document E-5 in this appendix) and the Department of Fish and Game (September to December reference comment number 2) have been provided. These agencies have the expertise in prioritizing important aquatic resources. The Navy will consider any changes to these recommended time periods for dredging operations until the expiration of the comment period on this environment impact statement.

7. Formation of a fluid mud layer would adversely impact the benthic community. Fluid mud can destroy benthos by separating them from the overlying water upon which they depend for respiration and food. The areal coverage of the mud can spread beyond the disposal site boundaries and may persist for several weeks. Formation of a fluid mud layer would be greatest with Alternative #2-C (hydraulic cutterhead dredging with pipeline aquatic disposal),moderate with Alternative #2-B (hopper dredging with aquatic disposal), and least with Alternative #2-A (clamshell dredging with barge

aquatic disposal). Fluid mud poses little direct threat to water column fish due to the unlikely chance of encountering fluid mud and the abililty of fish to avoid an affected area. However, extensive formation of fluid mud would indirectly affect demersal fish by destroying benthic organisms upon which they feed.

Many invertebrates such as the benthic worms are suspension feeders. Elevated turbidity levels can clog the filtering apparatus of these organisms, and if the turbidity level is too severe, the ogranisms may cease filtering. Loss of efficiency in feeding can cause stress and perhaps mortality. Turbidity in both the upper and lower water column would be greatest with Alternative #2-C (hydraulic cutterhead dredging with pipeline aquatic disposal). Of the three aquatic disposal alternatives, disposal induced turbidity would be least with barge disposal (i.e. Alternative #2-A). Also, reference paragraphs: 4.29 thru 4.60 - Water Quality; 4.68 thru 4.75 - Benthos; 4.76 thru 4.85 - Fish; and 4.86 thru 4.95 - Wildlife.

Regarding the duration of dredging by method of dredging refer to the response to comment number 3.

8. This environmental impact statement (as reflected in the narrative, incorporation by reference of two major studies, and use of other referenced studies (See "Reference" list)) in its analysis of dredging impacts is based on research conducted to date both within and outside of the study areas. It appears that at any given time of year aquatic resources would be affected by dredging activities. Determination of the least adverse dredging period is outside our expertise. The public comment period on Corps regulatory permit applications provides the opportunity to recommend appropriate times of the year for conducting dredging operations. The recommended dates for conducting dredging operations provided by the resource agencies (see response to comment number 6) are based on available information and expertise.

9. All three types of dredging equipment considered for use in this environmental impact statement (i.e. clamshell, hopper, and hydraulic cutterhead) are expected to be available for the proposed dredging. It is noted that Corps of Engineers capabililty for hopper dredging is currently minimized. However, private industry self-propelled hopper dredge capability exists and is available on the west coast.

10. Most new sediments enter the Bay system during the months of maximum runoff (i.e. winter). Shallow bays, where tidal velocities are low are the respository areas after the sediment laden freshwater mixes with the saltwater. During winter wave suspension of sediment is at a minimum thus allowing for the accumulation of sediments. Daily onshore breezes during the spring and summer generate waves over these shallow areas, resuspending sediments and maintaining them in suspension while tidal and wind - generated currents circulate the sediments throughout the Bay. These suspended sediments are repeatedly deposited and resuspended in the shallow areas until they are finally deposited in deeper water. During the spring and summer there is a net movement of sediment from the shallow repository areas thus

bringing equilibrium back to the shallows where wave action is no longer effective in resuspending the sediment. Once the sediment reaches deeper water, usually in natural channels or along the margin of natural channels, tidal currents become the primary transporting mechanism. When the resuspended sediments from the shallows reach the natural channels, the sediment tends to be transported along the channel in the direction of net flow (i.e. towards the ocean).

Dredging of Pinole Shoal and Mare island Strait with aquatic disposal at SF 10 and SF 9 respectively has the effect of redistributing the sediments within the Bay System. These aquatic disposal sites are along channel margins or in natural channels. No net accumulation of dredged sediments has been detected at these disposal sites since disposal activities at the sites were initiated. Disposal of dredged material in these high current velocity areas as well as using the nearest disposal site towards the ocean from the dredging site has the effect of eliminating one or more steps of the resuspension - recirculation - redeposition cycle in the natural process of transporting sediments through the estuary to the ocean. The Bay's network of natural channels leading to the ocean is not continuous thus causing dredged material (like natural sediments) to exceed the natural channel boundaries and move onto the shallow areas as part of the resuspension - recirculation - redeposition cycle. The dredged material which moves into the shallows is dispersed and does not inhibit the system's ability to resuspend and recirculate the material.

Dredged sediments released at the Carquinez Strait (SF 9) disposal site disperse rapidly and over a wide area. The estimated total return of dredged material to Mare Island Strait after disposal at Carquinez Strait (SF 9) is no more than 15 percent. This estimated 15 percent return of dredged material into Mare Island Strait is not significant when compared to the suspended sediment loads which enter Mare Island Strait via the Napa River and Delta from natural erosion processes. In addition, the homogeneity of these sediment sources and the Mare Island dredged material is not expected to cause any degradation of the Napa River or Napa River Marsh. (Reference Appendix E - Material Release, Dredge Disposal Study, dated August 1977).

11. The summary and comparison of significant impacts by alternative, paragraph 3.15ff, has been revised. Also, see response to comment number 7.

12. See response to comment numbers 7 and 11.

13. See paragraphs 4.43, 4.52, 4.56, and 4.48 regarding dissolved oxygen concentrations by methods of dredging. Also, see response to comment number 7 regarding turibidity impacts on fish and invertebrates.

14. The avoidance of dredging activities during major migratory periods of anadromous fishes is essentially based on the expertise and recommendations provided by the resource agencies. It is assumed that the recommended periods of dredging are based on available information of which part is derived from the various data collected on a regular basis (reference response to comment

number 6). Studies which are relevant to the environmental impact of the proposed deepening of Pinole Shoal and Mare Island Strait are found in the list of "References" at the end of the main body of the EIS. These referenced studies, via their purpose and findings, are related to the significant concerns discussed in the EIS and address the impacts of the proposed project.

15. As part of the channel completely through Pinole Shoal is already deeper than 36 feet below MLLW, the shoal does not function as a barrier to deeper water with higher salinity concentrations in the Central Bay area. The proposed dredging would only widen portions of the channel where this depth is not available over the full 600-foot channel width. Considering the minor change this would make in the navigation channel and in the total channel available to tidal flows, it would be impossible to detect any change in intrusion in either the San Francisco Bay-Delta Model or the prototype. The possible effect of the proposed dredging cannot be approximated from available model tests because portions of the channel through the shoal that are deeper than 36 feet below MLLW were not duplicated in the model and the magnitude of change in intrusion with increasing channel depths is not a linear relationship.

STATE OF CALIFORNIA
EDMUND G. BROWN JR., Governor

SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION
30 VAN NESS AVENUE
SAN FRANCISCO, CALIFORNIA 94102
PHONE: 557-3686

June 24, 1981

Colonel Paul Bazilwich, Jr.
District Engineer
Department of the Army
San Francisco District Corps of Engineers
211 Main Street
San Francisco California 94105

SUBJECT: U. S. Navy Deepening of Pinole Shole and Mare Island Straint
Draft Environmental Impact Statement

Dear Colonel Bazilwich:

We have reviewed this Draft Environmental Impact Statement and have no comments. Thank you for the opportunity to review it.

Very truly yours,

PHILIP KERN
Senior Planner

PK/lg

Contra Costa Resource Conservation District
5552 Clayton Road Concord, California 94521 · Phone (415) 687-1780

June 1, 1981

Col. Paul Bazilwich, Jr., Dist. Engineer
Department of the Army
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, California 94105

Subject: DRAFT ENVIRONMENTAL IMPACT STATEMENT - U.S. NAVY DEEPENING OF PINOLE SHOAL AND MARE ISLAND STRAIT REGULATORY PERMIT APPLICATION BY THE COMMANDER, MARE ISLAND SHIPYARD, SOLANO COUNTY, CA

Dear Col. Bazilwich:

The SCS technical staff, at the request of the Contra Costa Resource Conservation District, has reviewed the above draft EIR and advises:

> "We have no comments to submit concerning the Draft Environmental Impact Statement to dredge approximately 100,000 cubic yards of material from Pinole Shoal and approximately 1,500,000 cubic yards of material for Mare Island Strait."

Thank you for allowing us to review the DEIS.

Sincerely,

Rodney P. Kilcoyne

RODNEY P. KILCOYNE, President
CONTRA COSTA RESOURCE CONSERVATION DISTRICT

RPK/n

Solano County Mosquito Abatement District

EMBREE G. MEZGER, MANAGER-ENTOMOLOGIST

P.O. BOX 304, SUISUN, CALIF. 94585

Telephone (707) 425-5768

Meetings: Second Monday Every Month
Mosquito Bldg., Suisun Plaza: 7:30 p.m.

June 3, 1981

Colonel Paul Bazilwich, Jr.
District Engineer
Department of the Army
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, California 94105

Subject: SPNED-E/SPNCO-R, U. S. Navy Deepening of Pinole Shoal and Mare Island Strait Draft Environmental Impact Statement.

Dear Colonel Bazilwich:

I appriciate receiving the DEIS for review and comment.

The Solano County Mosquito Abatement District recommends the use of the existing aquatic disposal sites SF 9 and SF 10 for disposal of dredge material.

Historically, land disposal of dredge spoils by hydraulic dredging of rivers and sloughs are very productive habitats for producing disease bearing mosquitoes and pest mosquitoes. In this regard, the Solano County Mosquito Abatement District does not recommend Alternative #3, Island #1 Cullinan Ranch as a land dredge material disposal site, unless mosquito prevention measures are incorporated into this alternative disposal site.

Enclosed for reference is a copy of Criteria For Mosquito Prevention In Dredge Material Disposal Sites.

Sincerely,

Embree G. Mezger
Manager-Entomologist

EGM:mjs
Encl: 1
cc: Reuben Junkert, P.E.
Vector Biology & Control Section
California Department of Health Services
Sacramento, CA.

Criteria for Mosquito Prevention In Dredge Material Disposal Sites

I. Background Statement: In many instances land disposal of dredge material creates mosquito breeding sources. Due to the initial high water content and characteristics of the dredged material, shrinkage cracks occur in the drying process. These shrinkage cracks provide ideal habitat for the production of mosquitoes. Experience by mosquito abatement agencies has shown the use of chemicals to kill mosquito larvae in the cracks is very inefficient and generally not practical. Solutions lie in the water management and periodic manipulation of the surface of the deposited material. Disking the spoil material fills and closes the cracks. Drainage of storm water and keeping the elevation of the ground water below the shrinkage cracks also prevents mosquito problems.

II. Disposal Site Management

1. Provide ditches and/or water control structures for drainage of surface water. An engineering survey may be necessary.

2. Disking of the area may be required to close shrinkage cracks.

3. Provide access roads that are capable of supporting maintenance, inspection and mosquito control equipment.

4. Areas designated for permanent water should be constructed and managed for mosquito prevention as necessary for the specific site. Generally, dense aquatic vegetation, algai mats and shallow water bring on mosquito problems.

5. Areas designated for wetland development (saltwater marshes) need ditches to promote and enhance tidal water circulation and/or water control structures (tide gates) to provide water management capabilities. The outboard levee system should be retained until sufficient drying has occurred and all necessary grading and ditching has been finished.

6. Retention of outboard levees and tide gates may be necessary or desirable for water management to prevent excessive production of mosquitoes.

7. Plan and fund a maintenance program for the area to provide for:

    a. Maintenance of ditches and water control structures
    b. Disking as necessary
    c. Maintenance of levees and access roads
    d. Occasional mosquito control with pesticides and/or a biological agent such as mosquito fish

1/ Prepared in conjunction with California Department of Health Services

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RESPONSE TO COMMENT BY THE SOLANO COUNTY MOSQUITO

ABATEMENT DISTRICT (3 JUNE 1981)

If Alternative No. 3 with land disposal on Island No. 1 - Cullinan Ranch is the selected alternative then mosquito prevention measures would be incorporated into the project.

TOM CORNETO (M.S.)

2903 Rising Star Drive
Diamond Bar, CA 91765
(714) 595-2068

June 9, 1981

211 Main Street
San Francisco, California 94105

Colonel Bazilwich,

Re: Public Notice No. 12659-24 (April 1981)
Deepening of Pinole Shoal and Mare Island Strait

I have completed my review of the referenced document and submit the following:

It is obvious from the data presented that a decision must be made between our national defense and the environment. As an environmentalist, I am always unhappy when flora and fauna are sacrificed for any project. However, I can also see that our national defense will be impaired, if the SSN 688 class submarine is not allowed to enter Pinole Shoal and Mare Island Strait for servicing and repairs at the Naval Shipyard.

Therefore, in the name of the national defense, I would like to suggest that the project proceed with the following recommendations:

1.) Utilize Hopper dredging with aquatic disposal.

2.) Time the dredging operations in an attempt to avoid sensitive periods when anadromous fish larval and juvenile stages are present. Avoid work during major migratory cycles - (April to June and November to January).

3.) Dispose of Pinole Shoals dredging material into the San Pablo Bay.

4.) Dispose of Mare Island Strait dredging material into the Carquienz Strait.

In closing, Colonel Bazilwich, thank you for asking me to review the referenced Draft Environmental Impact Statement. If you feel I can be of further assistance, please feel free to contact me.

Sincerely,

Tom Corneto

RESPONSE TO COMMENT BY TOM CORNETO, 9 JUNE 1981

Every attempt would be made to comply with the recommended timing of dredging Pinole Shoal and Mare Island Strait in so far as is operationally possible.

U.S. NAVY DEEPENING OF
PINOLE SHOAL AND MARE ISLAND STRAIT

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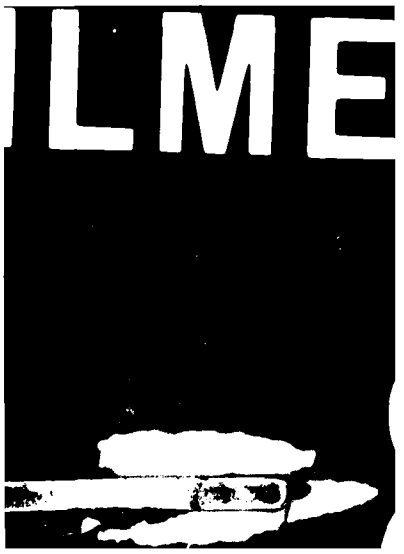
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